

# GEOLOGICAL CURATOR



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## GEOLOGICAL CURATORS' GROUP

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The Group is affiliated to the Geological Society of London. It was founded in 1974 to improve the status of geology in museums and similar institutions, and to improve the standard of geological curation in general by:

- holding meetings to promote the exchange of information
- providing information and advice on all matters relating to geology in museums
- the surveillance of collections of geological specimens and information with a view to ensuring their well being
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Cover image: GLAHM V6032, lateral view of 'right' side, showing putative *Lepus* lower jaw. Slab is 130mm wide. Picture by N. Clark. See paper by Liston inside.

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# PULLING TEETH : 2 - HUNTER'S TUSK, WODROW'S TOOTH AND THE BITE OF THE *LEPUS*

by Jeff Liston



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The fossil collecting of Robert Wodrow is assessed, in terms of the likely presence of his collection in the University of Glasgow (where he was librarian from 1697-1701), and possible confusion of such material with William Hunter's bequest. Further information is presented on two of Hunter's fossil vertebrate specimens, the mastodon tusk and the Gibraltar bone breccia, and a tally given of Hunter specimens so far identified.

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## Robert Wodrow: Palaeontological collector for the deluge

As discussed previously (Liston 2012: p. 405), there had been some intimation of natural science objects in the University of Glasgow from Robert Wodrow's time as librarian there (Durkan 1977), and some lack of clarity as to their eventual fate. This raises the possible doubt, first noted by Durant and Rolfe (1984) that fossil material predating Hunter's might exist within the University of Glasgow, and thus confound attempts to retrospectively identify material from Hunter's original bequest. Although this possibility was noted in Liston (2012), it bears further and closer examination.

Robert Wodrow (1679-1734) was the son of a Professor of Divinity at the University of Glasgow, where Robert himself was educated, becoming librarian there from 1697-1701. Sharp (1937) noted that after his ordination in 1703, Wodrow's tastes as evinced by his highly stylised letters (using, for example, 'qu' instead of 'w' for the five interrogative pronouns, with fluctuating spelling on other words) appeared to be much more fixated on religious matters (e.g. religious persecution of the covenanters), but prior to this time, in addition to giving dire warnings of the consequences of the forthcoming Union (Sharp 1937: p.xxxiii, 287, 290), his "interests ranged over nearly the whole field of knowledge - the state of Protestantism at home and abroad, Scottish history and antiquities from Pictish and Roman times, numismatics, natural history, new the-

ories and discoveries in science, the geography and ethnology of many countries, the language, customs and folk-lore of the Highlands, education at home and abroad, current books, and news of all kinds, whether of a process against witches, the birth of a monstrous calf, the problem of the divining rod, the way of fixing quicksilver on the backs of looking-glasses" (Sharp 1937: p.xxiii). Within this, his palaeontological interests featured prominently, providing one of his friends with the opportunity to gently reproach his status as a 'virtuoso' observing that:

"He visits mines, collpits and quarries frequently, not as others for gain, but for the sake of the fossil shells and teeth that are sometimes found there." (Sharp 1937: p.xxv)

Although this activity might seem trivial, Porter (1977) noted that outwith Oxford and Cambridge, earth sciences in universities at this time hinged entirely upon such individual enthusiasts, with Wodrow attempting to match in Glasgow what Andrew Balfour and Robert Sibbald were attempting by gathering material in Edinburgh for a grand project on Scottish natural history. So what of Wodrow's palaeontological material? No mere dabbler, Wodrow considered the fossil material in the context of Steno and others, Sharp (1937: p.xxxi) noting that: "To a great extent his interest in fossils is inspired by the hope of finding evidence to support the Scriptural account of the Deluge, as his preoccupation with the theories of Woodward, Ray, and Lhuyd clearly shows." And rather than embracing the easy answers of dogma, Wodrow admirably acknowledged that

there was no point in rushing to answers in such a fledgling area: "And if Mr Woodward's hypothesis were a little reformed from his unreasonable fancy of things subsiding according to their gravity after the earth's dissolution to a mussilage or pottage, and some other sphalmata proceeding from his want of ocular observations and taking things on trust from others, laying aside these I say, I look upon it as most satisfying and preferable to either Steno, Ray, or our friend Mr Lhyud's hypothesis. But the truth is we are not ripe for raising hypotheses as yet, and quhat ever lenth the last century has brought this kind of study, yet we want observations and experiments sufficient to found theorys on." (Sharp 1937: p.237). Wodrow then pulls back sharply at the end of his letter, ironically chastising his correspondent:

"You see quhat a lenth your curiouse reflections have led me into, and quhat a tedious letter you brought on your self. This kind of philosophical, crude, and undigested rapsody, with my hearty thanks, is all the returns I make to my lythoscop-ing freinds. Pray let it not terrify you from going on in your subterraneouse searches, but rather goe on from your own ocular observations to correct my escapes and set me right." (Sharp 1937: p.237).

As the only historically-noted intention to donate fossil material to Glasgow prior to the arrival of William Hunter's collection, did Wodrow's specimens persist to the date of the arrival of Hunter's material? On reviewing Robert Wodrow's correspondence (Sharp 1937), some details emerge, that enable us to discount Wodrow's material from ever having been confused with Hunter's in this way.

Firstly, the level of detail in Wodrow's letters is a great asset. He lists his specimens tirelessly, describing them to his correspondents both as discoveries and as the contents of packages that he dispatched to his network of colleagues for their consideration. This enables the reader to ascertain swiftly that there are few vertebrate fossil specimens throughout his collection, whether collected by him or exchanged with his network of correspondents, which included Edward Lhyd (1660-1709, at the time Keeper of the Ashmolean Museum in Oxford) from 1698 (Sharp 1937: p.xlvii). Although there are the odd mentions of fossil seeds, nuts and plant impressions (Sharp 1937: p.98, p.143, p.235), the bulk of the fossil material is clearly invertebrate, with Wodrow utilising the old names of Entrochus (crinoid), Modiolus (mussel shell), Turbonites (sea snail shell), Echinus (sea urchin), Lithostrotion (rugose coral), Pectunculites (clam shell), and Belemnites (probably an orthocone

cephalopod), almost certainly all collected from the Carboniferous of the Scottish central belt, whether by himself, Paterson or Lhyd. Only the mentions of glossopetrae (Sharp 1937: p.34-35, 110, 147) and bufonites (Sharp 1937: p.176) stand out as fossil vertebrates, although he mentions more non-traditional items such as "adder, paddock, corby & elf stones" (Sharp 1937: p.189), whose nature is ambiguous, in terms of whether they may or may not be fossil.

## Wodrow's tooth

The most famous of Wodrow's natural science specimens - in other words, the only one usually specifically referred to - is that of a "human tooth" (Durkan 1977). The story behind this specimen shows that Wodrow, notwithstanding his religious beliefs, did have considerable scepticism, in terms of accepting reports of specimen provenance at face value. This specimen first appears in Wodrow's correspondence in 1702, and his description is reproduced in full due to its interest. On the 9th November, he wrote to his long-time friend Lachlan Campbell in Kintyre, responding to his most recent letter, describing the specimen in spirits reminiscent of Robert Plot's (first Keeper of the Ashmolean Museum, Oxford) *Megalosaurus* as a human giant not twenty five years earlier (Evans 2010):

"Now I come to your last oblidging, curiouse, and instructive letter quich I received with your kind present of the human tooth and fossile nuts, both quich are extreemly curiouse, and are their value much heightned by your distinct and acurate accompt of them and oblidging reflections, with most of quich I intirely joyn. I should be glad to knou quhat observations Mr Freu [of Kilwinning] made upon the skull that this tooth was taken out of. The shape of the tooth makes me suspect it not to be human. I have a tooth just of its shape with the same gutters alongst it, gote at Lochlmond, only its near three times as bigg. That Mr. F. found it in a buriall place I cannot doubt, but I would propose this crude thought to you and him, whither it may not be the tooth of some horse or other animal, quich might be buried with some person of quality, as is the custom of the Muscovites and some other of the Northerns, or the head of some beast that might be sacrificed at some bodys death, quich you knou was a very ancient custome. The shape seems to me to be of the marine kind, quich augments the difficulty. That ther are and wer some persons of larger stature then others is past doubt, but such a proportion of body as this tooth would require can scarce be digested with me. I dare say the gyant would in a moderat calculation be three times my

hight, the tooth being more than 3 times the big-  
gness of mine. Allouing a proportionable thick-  
ness, he must have been a good jolly fellow. If the  
skull shall be found to have been proportionable  
he must have been a mere dunse, if the maxime  
holds treu that half witted people and fools have  
great heads. I shall be glad to be helped out of all  
thir difficultys by quhat further accompt you can  
get on Mr Freus observations, and your peircing  
reflections on them. I suppose all the declention  
of human stature by luxury we can allou will not  
be sufficient to solve this. Your oun curiosity noe  
doubt will suggest that you enquire into the antiq-  
uity of that buriall place, the depth of the earth it  
was found in, quhich varied in different ages, if  
ther wer any ashes or other large bones found by  
it, &c." (Sharp 1937: p.235).

In a letter to James Sutherland four days later, he  
maintains a sceptical tone in terms of provenance  
when noting that he had received "a tooth said to [be]  
taken out of a human head, found in ane old burial  
place in Kynntyre called Kil-colum-kill." ('about 2  
miles from my brother Dugald's parish church in  
Southend Of Kintyre' as Lachlan Campbell noted).  
His description noted:

"its of a prodigiouse size, more then 2 inch long  
& a little more than ane inch broad, soe that if the  
persons that took it out of the burial place and  
from a human skull wer not curiouse and inquisi-  
tive persons, and assured me of its being human,  
I would be ready to suspect the relation." (Sharp  
1937: p.240).

On 14/1/1703, Wodrow writes again to Lachlan  
Campbell of Kintyre:

"I had occasion to let a very considerable person  
see the tooth I had last from you. He was one as  
much seen in the study of nature as many I knou,  
and his verdict of it quhen I had given a hint of  
your accurate and weel attested accompt of it, was  
that it was worthy of the best repository in  
Europe. You see quhat far better judges then  
either you or I think of your tryfles." (Sharp 1937:  
p.246).

No more is written of this specimen, or its where-  
abouts, by Wodrow.

## Whither Wodrow's collection?

So, should we be looking for specimens of Bufonites  
(description 18, Liston 2012), glossopetrae (descrip-  
tion 13, Liston 2012) and such giant Scottish teeth in  
the collections of the University of Glasgow? First  
of all, it is worth noting that, of Hunter's vertebrate

fossil material, as recorded by Laskey, there is no  
mention of anything matching the giant tooth, and  
Hunter's glossopetrae are noted as explicitly coming  
from Malta (none of Hunter's palaeozoological mate-  
rial had a Scottish provenance, Liston 2012). So in  
terms of Wodrow's material being mixed or confused  
wth Hunter's this question only really applies to the  
specimens described as bufonites - of which no  
appropriate match was found in a recent search of the  
collection (Liston 2013a in press). Thus, in terms of  
the material mentioned by Laskey (our primary indi-  
cator of Hunter's vertebrate fossil material), we have  
no conflicted identifications. Secondly, the primary  
source for the idea that Wodrow's material was left to  
the University of Glasgow comes from his stated  
intention that he wishes to leave them to the  
University when he leaves his post as librarian. In  
February 1702, he writes to Edward Lhyd, imploring  
him (not for the first time) for news of a second edi-  
tion of the Lithophylaci - an edition that was never  
produced - so that he might organise his collection  
completely. By February 1706, long after leaving the  
university, Wodrow wrote to Lachlan Campbell (by  
then Minister of Kintyre) asking again for any news  
of specimens, but indicating that, despite leaving the  
University, he still has his collection with him (p.285  
- 4/2/1706 - for Mr Lachlan Campbell, Minister at  
Cambeltoun in Kintyre). Did Wodrow later donate  
his material? From the correspondence, it is not clear  
- as no fate is recorded in terms of the mention of any  
donation. But in the 1706 letter, he does note that his  
collecting of fossils has diminished - albeit with a  
possible underlying reluctance on Wodrow's part:  
"Since time and my station will not allou me to pro-  
secute that, I am nou upon another collection that  
seems more proper for my presentt employment, and  
that is of the curiositys, if I may say soe, or rather  
remarkables of Providence." (Sharp 1937: p.285).

This new 'collection' was envisaged by him as a  
'Magnalia Christi Scoticana' - a record of religious  
happenings in terms of the answerings of prayer and  
fulfilling of prophesies. Having been engaged in  
making this 'collection' since 1701 (the year he  
ceased to be University of Glasgow librarian), this  
seems to have become his new focus (possibly for  
the rest of his life, given that the manuscript was only  
published posthumously in four volumes by the  
Maitland Club throughout 1842 and 1843 as  
*Analecta: or Materials for a History of Remarkable  
Providences, mostly relating to Scotch Ministers and  
Christians*), as fossils are never again mentioned in  
the correspondence of his remaining twenty eight  
years. This is particularly striking, when one notes  
that prior to this February 1706 letter, Wodrow had



**Figure 1.** GLAHM V6032, *a*) main view. Jaw is visible to right of block. *b*) lateral view of 'right' side, showing the putative *Lepus* lower jaw - other bones and terrestrial gastropods are also present. Slab is 130mm wide. Both pictures by N. Clark.

written 41 pieces of correspondence mentioning fossils in the four years from July 1699 to October 1703. It was in the latter year that Wodrow became parish minister at Eastwood (after some years as a supply minister), a post he occupied until his death 31 years later.

It is apparent that of the specimens that passed through Wodrow's hands that might impact on the work to retrospectively identify Hunter's vertebrate fossils, only the glossopetrae and bufonites have any significance (see Liston 2013a in press). Following the apparent decline of his pursuit of fossils, as indicated by their disappearance from his correspondence, and the evidence that he had not made his planned donation prior to leaving the University of Glasgow in order to work as a supply minister for Blantyre, Houston and Eastwood parish, the question arises as to whether he ever made that intended gift? Wodrow's correspondence, although unusually detailed in its descriptions for the time, are not clear and specific enough to allow any hope of identifying precise specimens of any of his fossil material. However, his descriptions of coins are clear enough, and given that he planned to donate his coins as well as his fossils, we might look to the numismatic collection for signs as to whether his donation ever arrived. The Trajan coin (Sharp, 1937: p.189) and an intaglio (Sharp, 1937: p.190) are very clearly described, and work on the numismatic collection by Sally-Ann Coupar reveals that no items fitting those descriptions are in the non-Hunter material in the numismatic collection. This is strong supporting evidence that Wodrow's broad donation to the University of Glasgow never materialised - and thus the fossil collection at the University began with the arrival of William Hunter's material in 1807. This means that, in a similar way to the pioneering of the

method by Rolfe (1983), Durant and Rolfe (1984) and Mackie (on ethnographic material 1985, 1993), the Laskey process of elimination can be applied to the collections, to reveal the original Hunter specimens, in the absence of a Trustee Catalogue.

### **Breccia & 'Twist'**

As the piece in the previous issue of the Geological Curator (9-7) was returning from the printers, a number of loose ends of research were unexpectedly resolved, that enhanced the narrative surrounding William Hunter's material. For the sake of completeness, I include this addendum, to be read in conjunction with that preceding article.

Firstly, and most importantly, Neil Clark, the Hunterian's remaining Curator of Palaeontology (Liston 2011), tracked down the missing Gibraltar breccia specimen (GLAHM V6032, Laskey's Description 28, in Table 2 of the last issue, mentioned as missing on page 397 of Liston 2012), a specimen that neither of us had seen in the preceding twenty years at the Hunterian. As a specimen that Hunter published on, this is a particularly important (re)discovery (Figure 1a,b). The specimen's arrival in Hunter's collection can be unusually well dated, as John Boddington's original letter, written on 17/12/1769, presenting Hunter with the specimen and noting "petrified bones", still survives (Brock 2008: p.325-7, Liston 2013b) in the Special Collections of the University of Glasgow. Boddington (Secretary to the Board of Ordinance) notes that the head of the garrison on Gibraltar, a friend of his called Colonel Green, had brought him the specimen as a result of the use of explosives for work on the foundations of one of the fortification's walls, revealing "considerable quantities of petrified

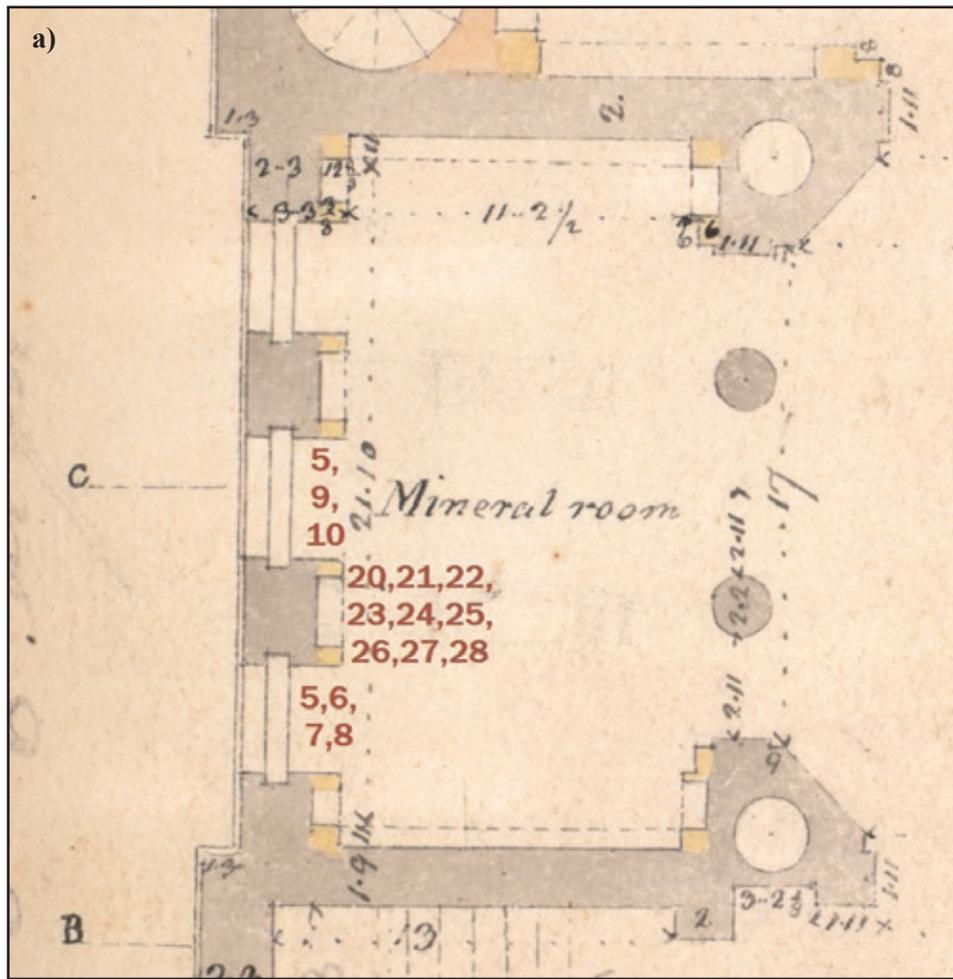
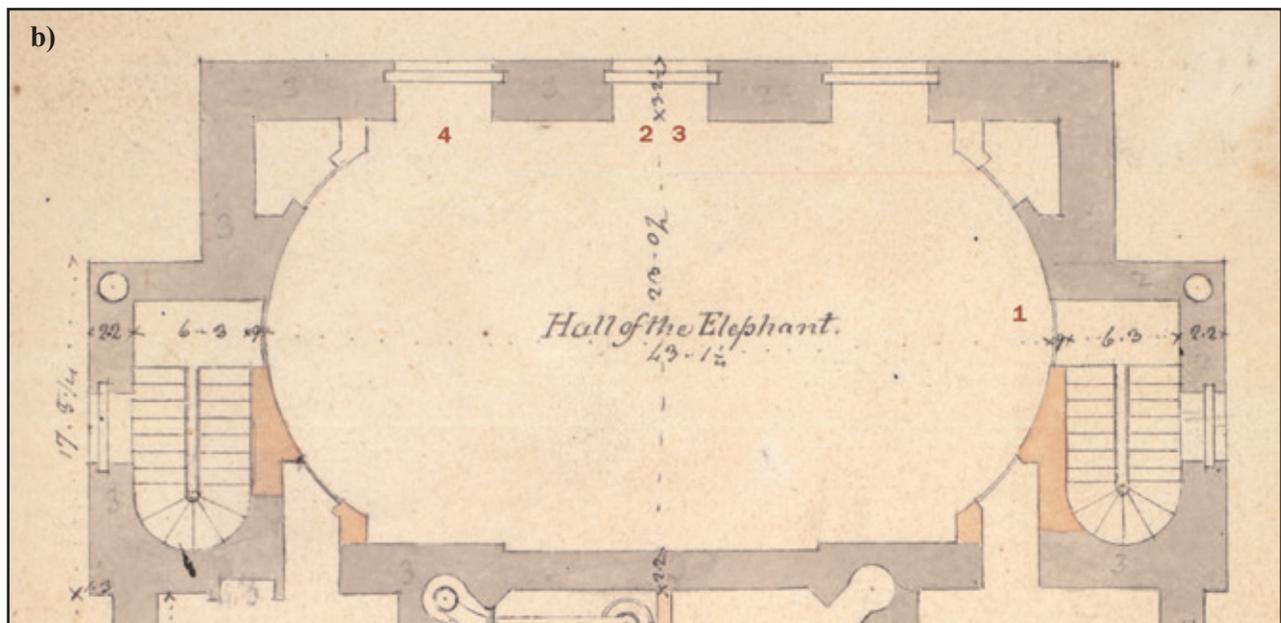
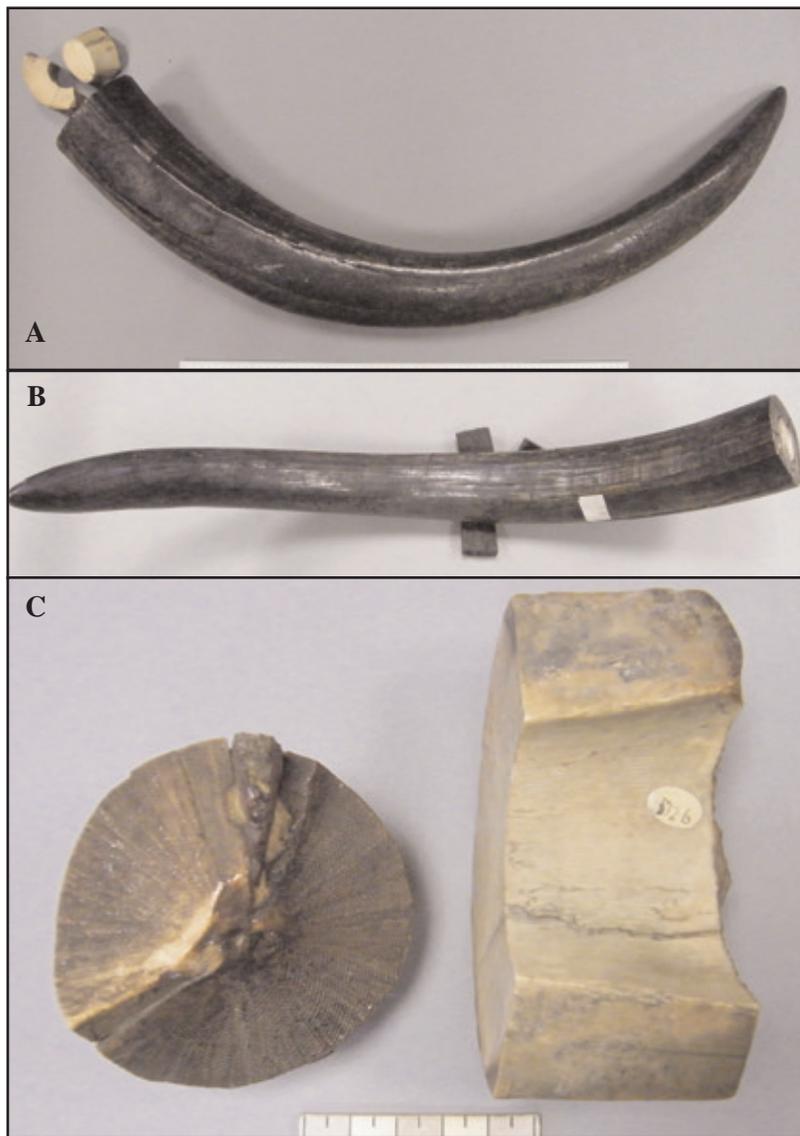


Figure 2. Details of modified versions of Stark's architectural plans for the High Street Hunterian Museum. a) Detail of Ground Floor Mineral Room from Figure 1c of Liston 2012. b) Detail of Basement Level Hall of the Elephant from Figure 1b of Liston 2012. For significance of superimposed numbers, see Table 2 of Liston 2012. All images of Stark's plans reproduced courtesy of University of Glasgow Special Collections (MS Hunter 574 S.4.19, pages 3,4,5). The three levels of the building were originally reproduced in unmodified form in plate 2 of Mackie 1985.



bones" (Brock 2008: p.325). In an undated letter to the Principal Secretary of the Royal Society (Matthew Maty, three paragraphs of which form a near-verbatim reply to Boddington), Hunter openly admits that in viewing two specimens in his possession (possibly one of the others noted as being sent to the Archbishop of Canterbury), he had mistaken them for human bones. Although it may be hard to reconcile how someone could have misidentified

such remains, now identified as leporid (rabbit or hare) by Jerry Herman and Andrew Kitchener (both of the NMS) rather than definitively *Lepus* as noted in the Hunterian's registers, it is worth noting that some preparation work was done by the Hunters to the teeth, to clear them "of the crust that covered them, so as to see their shape more distinctly" at which point William realised that they were "of some quadruped" (Brock 2008: pp.326-327). Hunter also,



**Figure 3. William Hunter's mastodon tusk, GLAHM V5530, with two removed parts.**

**A The Curve of the Ohio.** "The first, or uppermost figure shews its curvature as lying on the ground. This I shall call it's Curve." (Brock 2008: p.351). Scale bar is 610 mm.

**B The Twist of the Ohio.** "The second figure shews its appearance when it is so held up that you look partly on its side and partly on its concavity. This shews its winding, or spiral line, which I call the Twist. Most Bulls which I have seen have little more than the curve(it.) in their horns; that is, the axis of the horn is all in the same plane: but cows and oxen, have, besides the curve, the spiral Twist of horn." (Brock 2008: p.351).

**C The two pieces sawn off by Hunter from the main tusk, in order to demonstrate the occurrence of ivory.** Scale bar is 50 mm.

significantly, noted that the bones were merely encrusted and "not in any other sense, petrified" (Brock 2008: p.327). The Royal Society published both of the letters (between Hunter and Boddington), along with a location plan, in its Philosophical Transactions the following year (Boddington and Hunter 1770).

Laskey's *General Account of the Hunterian Museum*.... notes the presence of the specimen on page 132: "A large fragment replete with bones from the Rock of Gibraltar." Similarly, in the document interpreted as Robert Jameson's guide for the layout of cases (MR 24, see Liston 2013a in press) notes "9 - Mass of the osseous conglomerate of Gibraltar (1 specimen)". This is further support for the interpretation of MR 24 as being a case layout document, as this specimen is preceded by "8 - Petrified fish in Limestone from Pappenheim' 1 box also 'dendritic delineations', Belemnites, Gryphite, Trochite, Pectinites, Serpulite, petrified fish in bituminous marl slate from Thuringia (4 specimens)" on that

piece of paper. Comparing these descriptions with Table 2 in the preceding issue of *Geological Curator*, one can see that the putative Jameson descriptions 8 and 9 correspond to the vertebrate fossil material in Laskey's descriptions 5-6 and 28. Comparing them to the plan of the ground floor of the Hunterian Museum, as shown on Stark's drawing, one can see that 5, 6, and 28 are indeed adjacent according to Laskey's descriptions of the salons (Figure 2, detail of Liston 2012, Figure 1c - for all three floors of Stark's Hunterian Museum, see Mackie 1985, Plate 2). Durant and Rolfe (1984) first identified this specimen as that noted by Laskey, although reviewing its size makes one wonder if Laskey's use of the descriptor 'large' reflects the fact that today's specimen is merely the remains of a much larger piece.

The second of the loose ends of research to be tied up, concerns Hunter's mastodon tusk. It has been possible to take some new images of the tusk (GLAHM V5530), to more accurately reflect William Hunter's original description in the letter

believed to be addressed to Peter Collinson. These are reproduced here, to more accurately reflect the drawings that William seems to be describing in his correspondence to Collinson than the previously-reproduced images did. These new images (Figure 3a,b) have enabled confirmation of the identity of the tusk as mastodon (as per William Hunter's description) as opposed to mammoth (as recorded in the Hunterian's registers), by Andrew Kitchener (NMS) and Adrian Lister (NHM). In addition, a further search of the collections by Neil Clark revealed two sections cut from the base of GLAHM V5530 (GLAHM V5760 and GLAHM V5740 - Figure 3c), consistent with the prediction made in the previous article that the specimen was sawn down from its greater length while in Hunter's possession. Indeed, Simmons noted that Hunter sawed a specimen in his collection to demonstrate that "true or genuine ivory is the production of two different animals and not of the elephant alone" (Simmons 1783: p.19-20). The addition of these two sawn-off pieces brings the total and bow-lengths much closer to the figures originally noted by Hunter for his specimen, with an absolute length increase of just over 50mm.

The mastodon tusk (Figure 2b) and the Gibraltar breccia can both be localised on the William Stark plans for the Hunterian Museum (see Liston 2012 Figs. 1b,c), held by the Special Collections of the University of Glasgow (MS Hunter 574 S.4.19, pages 3,4,5), of which some duplicates are also held by the University of Glasgow's Archive Services Department.

## Conclusion

The recovery of the Gibraltar breccia, when combined with work on the fossil fish and mammal collections, brings the total number of identified William Hunter vertebrate fossil specimens to 25, augmenting the original total of 3 from the previous work of Rolfe. This is a significant and diverse quantity of such material for an 18th century collector, particularly one who published on fossil vertebrate remains as evidence of extinct animals, to survive and be recognised in the 21st century.

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Mackie for pioneering the technique of divining the material in Hunter's collections from Laskey, as used by Ian Rolfe and myself.

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# CUSTOM-MADE TOOL FOR CUTTING LARGE QUANTITIES OF STANDARD SIZE PADDING - BRISTOL DINOSAUR PROJECT

by Pedro A. Viegas and Charles Clapham



Pedro A Viegas and Charles Clapham 2012. Custom-made tool for cutting large quantities of standard size padding - Bristol Dinosaur Project. *The Geological Curator* 9 (8): 429 - 432.

At the Bristol Dinosaur Project, the processing of thousands of microfossils makes it essential to have good methods and materials for protecting such an immense number of specimens. We present a simple tool for cutting thousands of standard-size Plastazote® foam pads which saves time and minimises repetitive strain injury to those that have to do the job.

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## Introduction

Efficient conservation methods are essential in fossil preparation. At the Bristol Dinosaur Project (BDP), good conservation methods are vital to preserve the prepared minute microfossil specimens. Protecting them for future use by researchers is no easy task, because of their delicate nature and quantity. As Smith (2007) stated, "microfossils can be very numerous ..... curation costs per unit add up quickly for time and materials ..... a poor storage system can take up a disproportionate amount of space in a cramped collection".

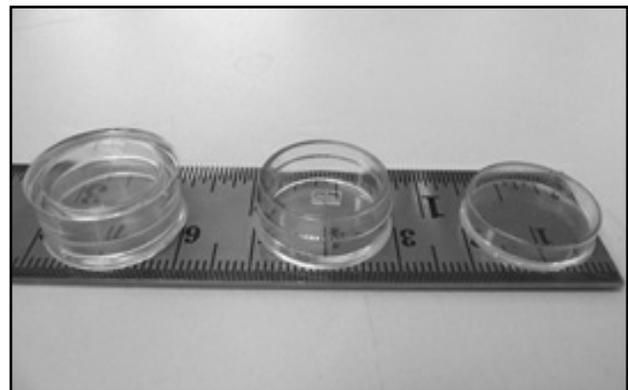
At the BDP new methods of specimen storage were developed in order to protect the specimens, to maximize the available space and to facilitate access to specimens. One of these new methods is the custom-made lining of all specimen housings with Plastazote®, a closed cell cross-linked polyethylene foam, protecting these extremely fragile specimens from being destroyed by being loose in card or plastic boxes. The standardization of box sizes and the need to create thousands of pads for them involved a painstaking task that even the most willing volunteer eventually refused to do. The repetitive job of cutting round pieces of Plastazote® with a cutting punch gave the operator very sore hands. In this paper the authors describe the materials and methods used to create a simple and very effective tool to cut thousands of standard-size pieces of padding material.

## Materials overview

Micropreparation is any manual preparation of verte-

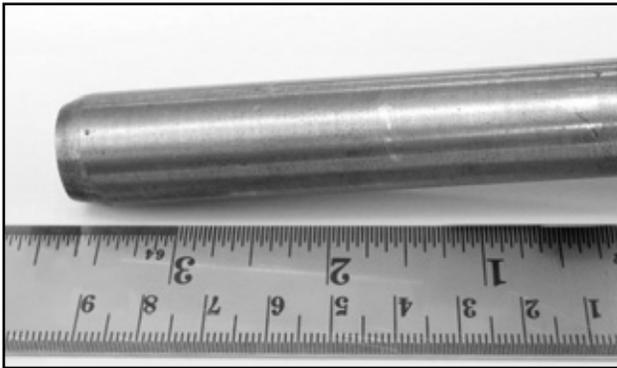
brate fossils on a scale that virtually requires the use of a microscope (Madsen 2009). Even though this is not the case for all fossils recovered from the BDP's acid processing, we generally tend to call them microfossils. With an average size between 250µm to 15 mm, the fossils handled at the BDP are very fragile, not only because of their size and taphonomic history, but also the outcomes of acid preparation methods; all this makes them very friable and therefore in need of proper conservation treatment.

Specimens are picked and placed individually into clear round Polystyrene containers with an external diameter of 20 mm and internal diameter of 16 mm (Figure 1).



**Figure 1.** Clear Polystyrene receptacles used for microfossil storage at the BDP.

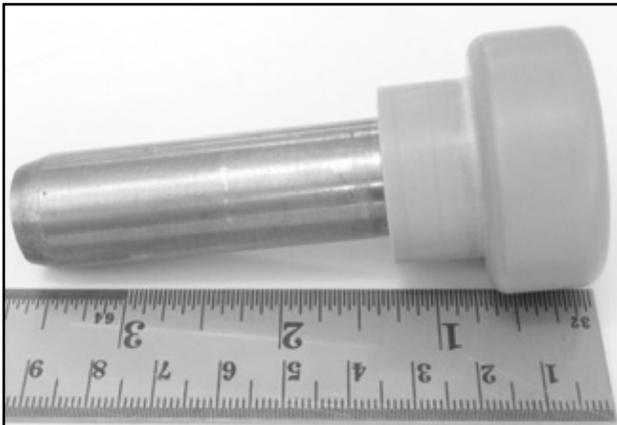
Round Plastazote® pads were cut using a hand-held mild-steel punch (Figure 2), which is simply a piece of 20 mm-diameter solid mild-steel pipe that has been partially hollowed and sharpened. This punch, even though very effective for producing a couple of



**Figure 2.** Hand punch originally used - a piece of sharpened mild steel tube.

pads at a time, gives a very sore hand when handled hundreds of times, because of the natural position the user adopts while making the downward-circular movements necessary to cut a round object with such tool.

After several complaints from our volunteers and a very sore hand from one of the authors a new method had to be created. A custom-made PEEK knob adapted to the existing punch was fabricated by one of the authors (C.C.) in an attempt to increase the area upon which the hand would exert pressure and thus reduce the hand stamping and painful after effect (Figure 3). This did not achieve the expected outcome and the adapted punch still gave the operators sore hands. The hand-held type of punch was discarded and a new, completely user-friendly tool had to be made.



**Figure 3.** PEEK knob adapted for the hand punch, to protect the operator's hands.

## Construction of the custom cutting machine

The solution to our problem was to construct a tool that would cut thousands of standard size padding material with no painful after effects to the operators. The eureka moment came considering how a hole-punch bladed cylinder works and trying to make

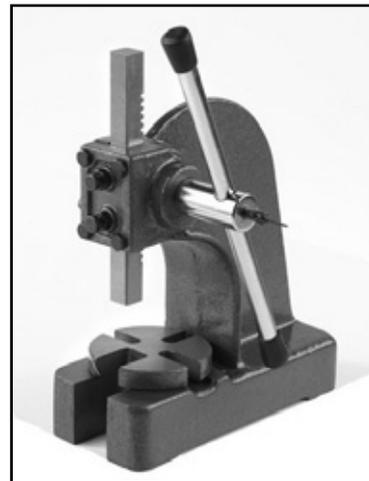
something similar, but for cutting thick padding materials.

A small Clarke® Arbor press was ideal for this, as it has a long central post that can be adapted with almost any kind of bit/tool and it operates by a simple and smooth lever action that multiplies the force and therefore reduces the amount of force exerted by the operator. By creating a punch bit with the exact dimensions of the standard size boxes used at the laboratory and fitting it to the Arbor press post, all padding making problems would vanish.

We present a step-by-step description of the manufacture of this tool.

## The Cutting Bit

1. An easily available and cheap 1-ton Arbor press was bought (Figure 4); there are numerous online sites that sell these for very cheap prices, and they come in a variety of tonnage.



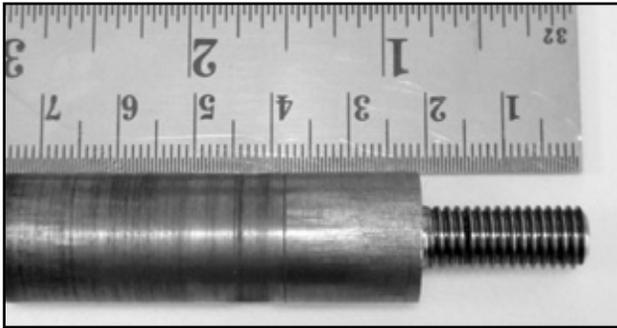
**Figure 4.** Clarke® 1Ton Arbor press.

2. The press was dismantled and an 8 mm thread was machined into the base of the central post (Figure 5).



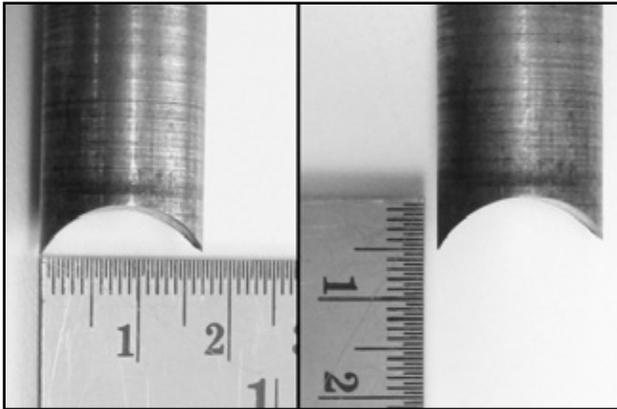
**Figure 5.** Machining the 8 mm thread into the Arbor press ram.

3. A piece, 75 mm long, of 20 mm-diameter mild steel was cut and a thread 20 mm long was machined in to it (Figure 6); this is the blank cutting bit.



*Figure 6. The 8 mm thread, machined into the mild steel blank.*

4. A concave hole-punch shape was machined into the cutting bit (Figure 7), 5 mm deep.



*Figure 7. Concave hole-punch shape machined into steel blank.*

5. Finally a hole, 7 mm in diameter, was drilled into the cutting bit about 30 mm from the cutting tip, which will serve to tighten or un-tighten the cutting bit in the press (Figure 8).



*Figure 8. A 7 mm tightening hole drilled into the finished cutting bit.*

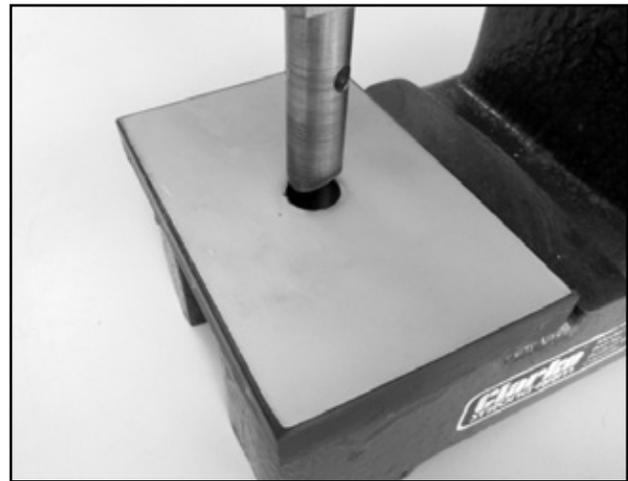
## The Support Plate

In order to get a perfect circle the cutting bit has to go through a plate with the same exact dimensions.

1. We cut a piece of Trespa®, a high pressure compact laminate (HPL), 130 mm long x 85 mm wide x 16 mm deep (Figure 9), that fits perfectly into the base of the Arbor press. The choice of Trespa® has to do with its impact and chemical resistance properties, and also because it is a readily available material at the University's workshop, but other materials such as steel or aluminium could be used.

2. A hole with 16 mm in diameter was drilled into the centre of the plate.

3. The plate was glued using medium strength epoxy (5 min. Epoxy) in order to be strong, but easily removable if necessary.



*Figure 9. Trespa® plate drilled and glued into the base of the Arbor press. Perfect alignment with the cutting bit is fundamental.*

## Conclusions

By using 2 mm thick mild-steel tube, shaping the tip into a concave hole-punch-like shape and adapting it to an easily available and cheap Arbor press, the cutting process is now not only pain-free but also fast and fun. It is now easy to produce thousands of standard size padding material in less than an hour, ~ 3000 p/h.

Another advantage of this system is the almost limitless possibilities that threaded tools bring; one can easily remove the cutting tip by unscrewing it and attach any other custom made cutting tip with any different size or shape. For this the Trespa® base plate would be screwed to the Arbor press using countersunk or butterfly screws instead of glue. Another improvement could be the use of higher quality stainless steel instead of mild steel, this could keep the cutting bit sharper for longer.

Notice that the presented production numbers are ideal for the project this tool was designed for, the BDP, where the needs for this padding material is about 3000 every month and a half. Other projects with higher production demands might need to resort to numerous operators or to a specialist cutter with hydraulic or similar cutting equipment to cut in bulk without the risk of causing repetitive strain injuries to the operator.

### **Acknowledgments**

We thank the Heritage Lottery Fund for funding the BDP for 4 years. Also a big thanks to Ed Drewitt for his comments and a special thanks to Mike Benton for his encouragement and valuable comments during the writing of the manuscript.

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# USING THE INTERNET AND SOCIAL MEDIA TO BRING DINOSAUR PREPARATION TO A WIDER AUDIENCE

by Darren H. Tanke and David W. E. Hone

*Darren H. Tanke and David W. E. Hone 2012. Using the Internet and social media to bring dinosaur preparation to a wider audience. The Geological Curator 9 (8): 433 - 440.*



Of all the processes of the science of palaeontology, the actual preparation of fossil specimens to a condition suitable for display, research, and education is perhaps the least recognised and understood by the general public. Documentaries and popular books feature the excavation of specimens and their final status but rarely mention the critical, and often long and detailed, intervening work. Recently the authors embarked on a series of posts on the blog of DWEH which narrated the process of preparing a largely complete tyrannosaur specimen by DHT from opening the jacket to a finished display- and research-quality specimen. Here we review this outreach process and discuss the benefits of such a scheme. While this series has not to date attracted a large audience, it does nevertheless provide a model for future projects and is readily accessible and permanently archived as a source of information online.

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## Introduction

Fossil preparation is largely overlooked by general public yet a common display feature in modern museums where the public can look into a preparation lab window and see work being done (e.g. Carnegie Museum, Pittsburgh; The Field Museum, Chicago; Royal Tyrrell Museum, Drumheller; El Museo del Desierto, Saltillo). Usually however, there little to no explanatory signage as to what is actually going on and especially *how* it is done. Some preparation windows are open so that the public can speak face to face with preparator. However, this is not viable for big museums with high attendances, and in any case risks the preparators answering the same basic questions repeatedly and only being able to convey the simplest information across the divide. Based on the experience of the authors, the first questions generally asked when the public can speak to a preparatory are of the nature "What is it?", "How old is it?", "Is that a real bone?", or "How long will it take to finish?". Their instant reaction is understandably to know what is being prepared rather than ask about the preparation process. In any case, long and detailed answers cannot really be provided in such a setting and only a limited audience will be reached with any given exchange.

Similarly, television shows or educational books will

often spell out in some detail how fossils are collected in the field, but little of the process that takes them from a jacket in a museum storage facility to a display or research condition. A few bare words about chisels or aircsribes and careful, 'time consuming work by skilled technicians', seems to be the limit of the explanation to this part of the process and typically describes the work as 'tedious' or 'painstaking'. Thus while the general public may well be aware that such a process must happen, quite how is not elucidated. Even those who are more interested and involved in palaeontology and have 'graduated' to reading the technical literature will find little information on preparation work readily available. Although preparators are routinely thanked in the acknowledgements of manuscripts for their efforts and increasingly feature as authors, little information is provided about the techniques used to prepare the material prior to description though this will hopefully change in the future, (e.g. Farke *et al.* 2011).

Detailed works and discussions are of course available. For example there are a number of books discussing the applications of preparation (e.g. Kummel and Raup 1965; Rixon 1976; Converse 1984; Feldmann, *et al.* 1989) and even whole journals dedicated to the subject (<http://preparation.paleo.amnh.org/28/bibliography>), as well as major palaeontological conferences (e.g. those of the Society of

Vertebrate Paleontology and the Symposium for Vertebrate Palaeontology and Comparative Anatomy) having sessions devoted to preparation techniques and issues. The online Journal of Paleontological Techniques (<http://www.jpaleontologicaltechniques.org/>) also provides information, but is aimed primarily at specialists. However, many of the items described above are not readily accessible to the general public and even if a tome is purchased or meeting attended, these may prove impenetrable to a casual audience.

Despite these issues, there is an increasing awareness of preparation thanks to better displays and the 'windows' into preparation labs, and more TV shows following palaeontologists into the field and the lab. For example, the not widely released 1992 documentary "Messages in Stone" followed the senior author collecting an adult *Pachyrhinosaurus* parietal in field, doing fossil preparation of it, moulding and casting same and mounting cast piece onto a reconstructed skull still being worked on, but all the technical work was presented very lightly - no details of the work were provided.

There has therefore remained a gap between such basic information as 'the bones are carefully removed from the rock' and the details provided by textbooks and conferences. We proposed to fill this space by covering the preparation of a specimen from opening the protective plaster jacket through to a museum display and/or research quality finish. Each of the methods and techniques used would be described for a lay audience and documented through photographs. The format of a blog allowed direct communication between the public and the preparator ensuring that the level of detail was appropriate, yet was detailed enough so as to still be useful resource for an experienced museum or university-based professional fossil preparator.

Ultimately, the aim of this series of posts was simply to provide details of the preparation process to the general public and to effectively communicate this to a wide audience. This also provided a basis for exchanging information between preparators and researchers, and gave the public first hand access to a professional preparator through the comment threads and specific question-and-answer sessions. In this paper we describe the process of blogging about this work and the benefits to be derived from this form of outreach for the scientific community.

**Institutional Abbreviation: TMP: Royal Tyrrell Museum, Drumheller, AB, Canada.**

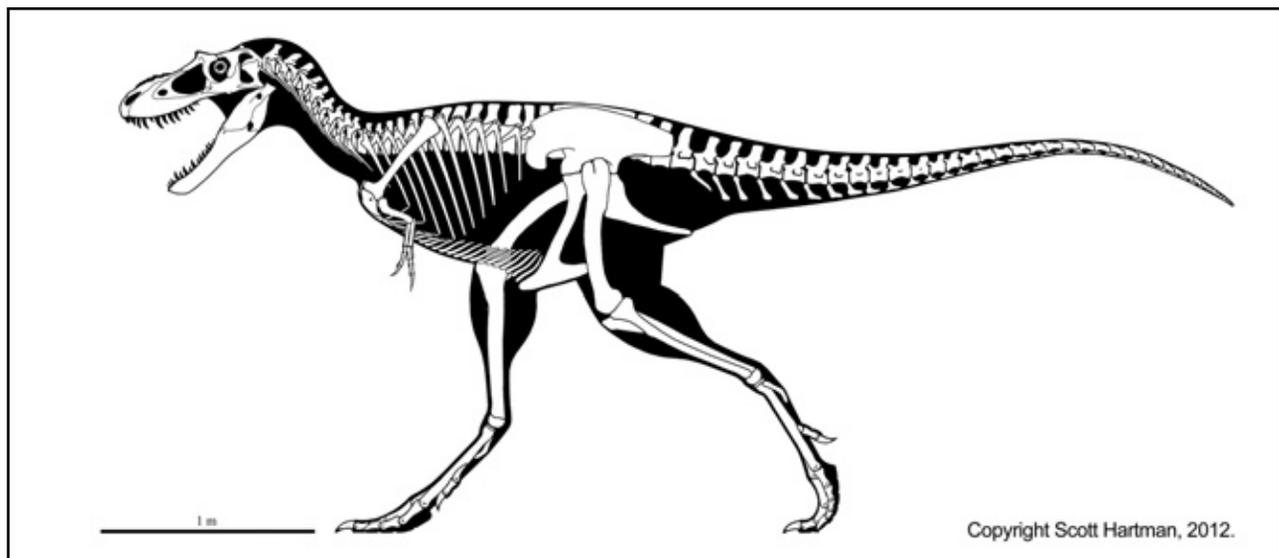
## Process

Following an invitation extended to DHT by DWEH to write on his blog about a *Gorgosaurus* skull under preparation, it was agreed that in fact an upcoming preparation of an additional specimen (TMP 2008.012.0014) of this genus would be a better option. This was in an unopened jacket and thought to be a complete or near complete subadult skeleton and would give the opportunity to document and discuss the entire preparation process. Permission was kindly given by the Royal Tyrrell Museum to document and publish this work online, with DHT writing and publishing photos on the blog and additional photographs appearing on the Tyrrell's official Facebook page which increased the overall web footprint of the project.

*Gorgosaurus* was an obvious candidate for the project. While the completeness and quality of the material was a clear benefit, a tyrannosaur would naturally be of significant interest and the bauplan and basic anatomy of the animal would immediately be familiar to a non-expert audience owing to the endless popularity of its cousin, *Tyrannosaurus* (Figure 1).

First described by Lambe in 1914, *Gorgosaurus libratus* was a large (approximately 8-9 m in length at adult) bipedal carnivorous dinosaur. A member of the tyrannosaurine group that dominated the ecological niches for large carnivores of the northern hemisphere in the Late Cretaceous, *Gorgosaurus* exhibits the typical morphology of the clade with a proportionally large head, robust teeth, robust body, reduced forelimbs but long hindlimbs (Currie, 2003; Holtz, 2004). Ecologically it was most likely both predator and scavenger (Holtz, 2008 - as indeed were most carnivorous dinosaurs) although it was not the only tyrannosaur at the time, overlapping in range with *Daspletosaurus* (Russell 1970; Holtz 2004) though contrary to popular belief the presence of numerous large carnivores in a single ecological zone is not unusual either for extant faunas or dinosaurs (Hone *et al.* 2011a).

*Gorgosaurus* is also known from numerous complete, or near-complete specimens in excellent condition (Holtz, 2004) and more material continues to be discovered. As such it was unlikely that the specimen would contain any new and important scientific information that could be accidentally revealed before detailed analysis was completed on the material. The preservation of the material and the rock it was encased in was such that although the specimen was likely complete, it would be a relatively simple and rapid preparation. Therefore the series would not



*Figure 1. Skeletal reconstruction of Gorgosaurus libratus by Scott Hartman (used with permission) based on specimen TMP 91.36.500, a subadult specimen similar to that discussed here.*

drag on for the audience and nor would they be lost in the complexities of an overly difficult task. Finally the choice of this specimen was appropriate as it was found in the field by DHT.

An unusual quirk of fieldwork that many can attest to is sometimes the best find of the season is found at close to or on the last day. This was true for the *Gorgosaurus* which was found in the last 40 minutes of last day of 2008 field season to Dinosaur Provincial Park in southern Alberta, Canada. The site was worked in 2009 (see TMP Facebook album: <http://www.facebook.com/?ref=hp#!/media/set/?set=a.93148090171.88109.37946265171&type=3>). During fieldwork, the snout on right (upper side) was found, in addition to ribs, a partial pelvis, and base of tail. The plastered specimen block was left in the field under a plastic tarp over winter 2009-2010 due to lack of money. Funding was obtained early in 2010 and the specimen transported out of the field by helicopter in March 2010. It was stored briefly until the senior author could finish off another large project and the 2010 field season was completed.

The rest of story was featured on the Archosaur Musings ([www.archosaurmusings.wordpress.com](http://www.archosaurmusings.wordpress.com)), a blog which has been running for over five years and focuses on archosaur palaeontology (especially theropod dinosaurs and pterosaurs) and issues of science communication. It has a reasonable following (typically 1000-1500 readers a day, rising to over 2000 on occasion and over 1.1 million total visitors). This is written by DWEH, though regular guest contributions are made by other academics and palaeontological experts. While the readers encompass many levels of expertise, this is aimed specifically at the

gap between the majority of the public with only a passing interest in palaeontology, and the serious palaeontological amateurs or experts. The Musings is part of a growing number of blogs that have appeared in the last few years focusing on Mesozoic reptiles coming from researchers with the likes of blogs such as 'Pick and Scalpel' (by Larry Witmer, [www.witmerlab.wordpress.com](http://www.witmerlab.wordpress.com)) and 'Chinleana' (by Bill Parker, [chinleana.blogspot.com](http://chinleana.blogspot.com)) and groups of researchers coming together with sites such as the eponymous 'Pterosaur.net' and the extraordinarily specific but very popular 'Sauropod Vertebra Picture of the Week' ([www.svpow.wordpress.com](http://www.svpow.wordpress.com)). DWEH has now been added as a blogger to the Science section of the website of the U.K. daily national newspaper 'The Guardian', providing a new level of outreach to a still broader audience. Collectively these are bringing the general public far closer to professional palaeontologists and through blog comments and question-and-answer sites (e.g. see Hone *et al.* 2011b) allow direct interaction with them.

The standard procedure we adopted was for DHT to produce short posts (typically just a few hundred words) every few days each covering a specific aspect of the preparation process. For example this could focus on the detailed exposure of a single bone, or the repair of a section, or more general issues such as health and safety or cutting open a jacket (Figure 2). The text and selected images were then passed to DWEH for editing and uploading to the site and to add links to previous posts in the series or other relevant parts of the blog. Both of us would check in and reply to comments and questions appearing on the site in relation to the posts. In total, there were 21 posts on the procedure, plus an introduction to the

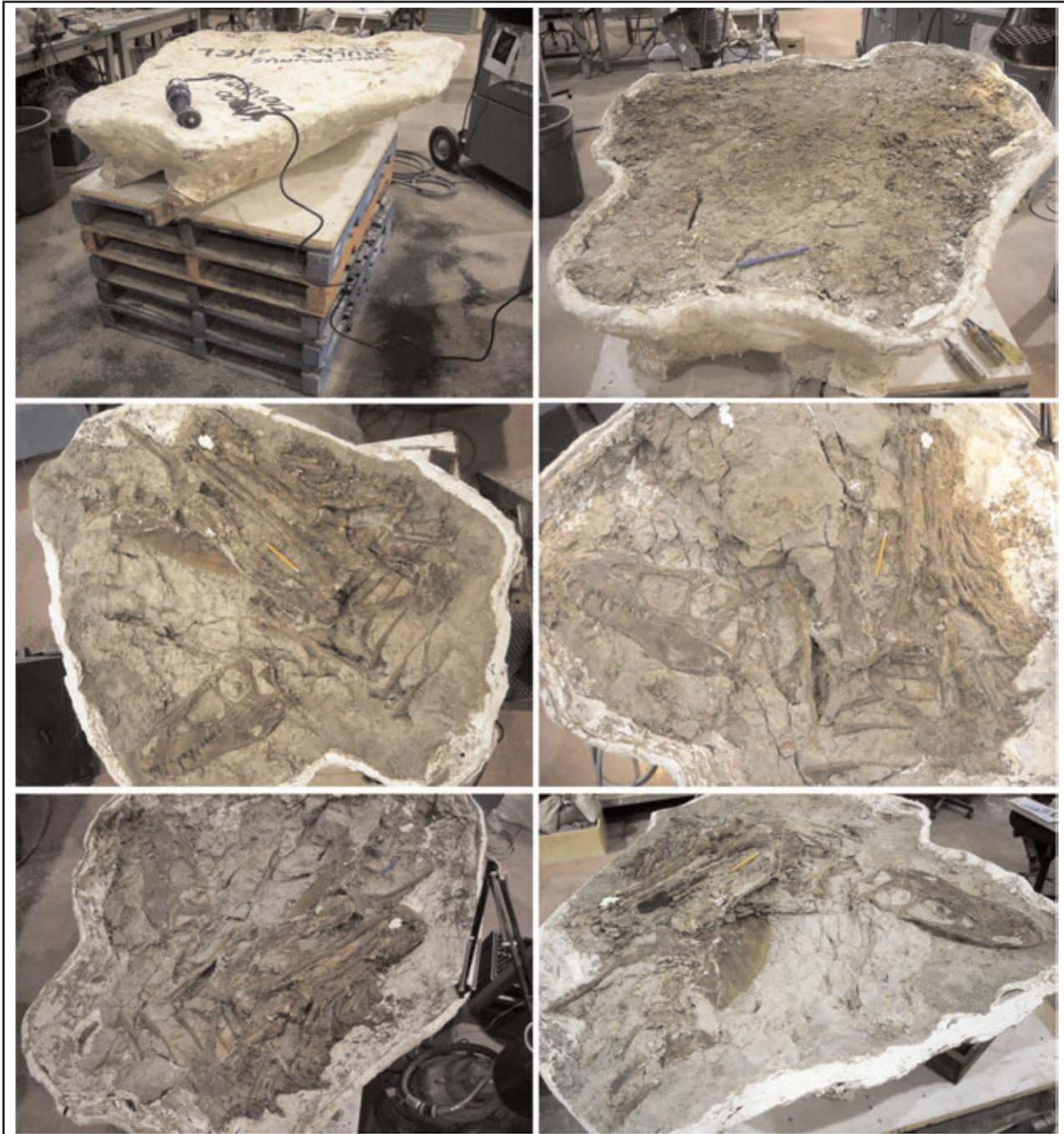


**Figure 2.** Selected photographs by D.H.T. illustrating selected tools and their use during preparation. Top: a home-made system to drip consolidating glue into a crack in the bone, Middle: various hand tools for detailed work on the material including a dental pick and mirror. Bottom: safety equipment - anti-vibration gloves, ear defenders (ear plugs), goggles and mask, all on a rubber mat. All of these images were first published on the Archosaur Musings.

project and a concluding piece (the concluding post links to every other one in the series and can be seen here: <http://archosaurmusings.wordpress.com/2011/02/22/darren-tanke%E2%80%99s-gorgosaurus-preparation-final-roundup/>). In addition, we specifically included a dedicated question-and-answer session midway through the process to allow people to catch up with the whole series to date and encourage a more active discussion over the work.

The first post was on the 24th of October 2010 and the last one on the 22nd of February, 2011 thus covering four months. A later series began on the 6th of June 2011 running till the 22nd of June, and took the series to over 30 posts in total with a final 'one off' entry in March, 2012. This was an average on one post every 5 days for the duration of the two main series, though of course there was some variation as this was dependent of the progress on the specimen and the duration of task at hand plus of course any issues of other commitments. The series ran between field seasons so both authors were available to answer blog questions promptly.

Preparation work was conducted at a normal rate, comfortable to the preparator and what was required to get the specimen prepared safely and properly (Figure 3). There was no set deadline for completion at Tyrrell Museum and therefore none on the blog. DHT submitted updates as he felt they were required. There were more at the beginning to set things up, then regular updates as work progressed then slowed down as the work became routine and fewer novelties appeared, and there was less and less to say as it had been covered previously. Updates were not really written to stand alone, but an effort was made in the writing to make reference to previous posts and hint at the direction the next preparation step would take, so regular viewers could follow progress logically and not in a disjointed fashion. While details of the actual methods were laid out and discussed, the key aspect was to show how long and careful this process can be and what is required to complete the work. The various themes of the posts allowed both the ongoing work over the overall preparation to be revealed, but also to provide details of the process in easily understood form. This included the use, and even manufacture, of tools for the work (Figure 2) and detailed descriptions of the preparation process, both to highlight the techniques used and the practicality and philosophy behind it. This especially emphasised that the work is meticulous, but certainly not tedious and that patience and care is paramount. The specimen is 75 million years old but 7.5 seconds of inattentiveness can ruin it forever.



*Figure 3. Montage of photographs by D.H.T. of the progress of preparation of Gorgosaurus, TMP 2008.012.0014. Starting top left moving clockwise, the field jacket in the prep lab, this is then opened and the work slowly exposes the skull and skeleton beneath. All of these images were first published on the Archosaur Musings.*

The whole process of recording and publishing online is both quick and easy to do. It took only a few minutes to take relevant photographs during preparation, and writing pieces typically took only 15-20 minutes. Formatting and posting things took typically just a few minutes, such that between us there was generally less than 30 minutes commitment in total per post. There was no editing of writing by professional editors, so the whole thing was 'real' and in more or less real time. Updates regularly covered what had been done just a few hours previously and really were up-to-date representations of the ongoing

work, giving the reader a sense of being there and looking over the shoulder of the preparator (Figures 3 and 4).

## Discussion

Clearly it is hard to measure the exact effectiveness of the series. While the Archosaur Musings enjoys a reasonable and regular following, the limited nature of that audience means that it was never too likely that the series would 'break out' and become mainstream. Certainly there was no drop in the number of visitors throughout the series and some individual



*Figure 4. Montage of photographs by D.H.T. of the progress of preparation of the skull of Gorgosaurus, TMP 2008.012.0014. Starting top left moving clockwise, the skull is slowly exposed and cleaned to reveal the details. All of these images were first published on the Archosaur Musings.*

posts did get higher than average reader numbers, (the most popular entries have over 600 views and register just in the top half of views of all posts ever on the blog, with further additions through 'syndicated' views) suggesting an interest in these and the series as a whole. These posts often also enjoyed higher numbers of comments than other posts, and there was also considerable interest noted on the Facebook page of the Tyrrell when photos of the preparation work were posted. At the bare minimum, there is now a permanently archived series of articles online detailing the methods used to prepare a dinosaur specimen.

An open access site in the modern social media (i.e. here blogging) has obvious benefits for communicating with the public. Unlike traditional media such as a magazine article or even a 'fixed' webpage, there is active communication and exchange between the authors and the public and it provides direct feedback and interaction between the two sides, creating an especially valuable educational tool. The open nature of blogging does of course make the articles open to all - there are no costs (either to creator or reader) and

modern search engines can make even 'obscure' subjects relatively easy to find. Our own cross-referencing of the series with links between individual posts and occasional summaries also made it easier for people to keep track of things and any persons stumbling onto a random post from the middle of the series would find it clear and simple to get back to the start and follow the whole story.

Moreover the web is 'instant' publishing and updates on the progress of the preparation could be online within hours of the work being completed. This helped provide a story and allows the public to become engaged with the project. With no restrictions imposed by page limits or layouts, individual posts could be as long or as short as required and numerous high-quality colour images could be included. Appealing to some no doubt was the lack of editorial control or supervision.

The web also provides an opportunity for people to become involved with the work beyond the obvious question-and-answer / comment format. The spirit of community and co-operation online can be superb

## Darren Tanke preps Gorgosaurus!



*Figure 5. Artwork by David Maas inspired by this series (used with permission). These are fun of course, but also provide further outreach opportunities to hook people's attention.*

and we, and the series, benefited from this. A digital artist in Australia volunteered his services to provide colour-balance work on a number of the most important images to enhance them. Another blogger (with our permission) translated parts of the series into her native Bulgarian such that the series would reach a wider audience. Finally, at least two works of art were produced with their creators being inspired by the work and one of these is reproduced here (Figure 5). Research on various aspects of the specimen are now underway and the specimen will eventually go on display too.

In short, the web gives us a unique opportunity to engage and exchange ideas with the public as well as providing the actual information as originally intended. It is also worth noting that at least some professional academics and preparators also read the series and contributed comments. As a result some ideas and practices were exchanged and discussed such that the series also effectively became an impromptu

forum for the discussion of preparation techniques. This demonstrates the draw of the series and also allows the public to see how such discussion take place - it brings the 'behind the scenes' work still further out into the light.

## Conclusions

Despite the low initial viewing figures (though these continue to grow slowly), this blog series has been a qualified success. This is and remains, to our knowledge, the only thing of its kind online - a detailed and illustrated description of the complete process of fossil preparation of a dinosaur skeleton. It has provided an excellent opportunity for the general public to see the detail and effort required to prepare such a specimen and for them to interact with both preparator and researcher and so get multiple views on the process. As an added benefit, preparation techniques were discussed between preparators as the series also became a forum for further discussion and deliberation. We hope the ease with which this process was achieved

and the obvious benefits to many parties will provide both a model and encouragement for others to provide the public with information on 'hidden' aspects of research such as curation which the public often have little awareness of, yet do appreciate when this is revealed to them.

## Acknowledgements

Most especially we would like to thank the Royal Tyrrell Museum for permission to publish such a series of photos and articles on an unpublished specimen. Special thanks must go to Drs. Donald Brinkman and Donald Henderson in this regard. We are grateful to Bill Spencer and the Dinosaur Research Institute (both Calgary, Alberta) both provided funds to support the costs of the airlift of the *Gorgosaurus* and another specimen. We also thank Scott Hartman and David Mass who generously contributed their work and allowed us to reproduce them here.

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# A DESCRIPTION OF TWO PHRAGMOTEUTHID COLEOID CEPHALOPODS FROM THE LOWER JURASSIC OF LYME REGIS, DORSET AND THE IMPORTANCE OF WELL INTENDED FORGERIES

by Benjamin Godfrey Hyde



Hyde, B.J. 2012. A description of two Phragmoteuthid coleoid cephalopods from the Lower Jurassic of Lyme Regis, Dorset and the importance of well intended forgeries. *The Geological Curator* 9 (8): 441 - 446.

The rediscovery of two fossil "cuttlebones" from Lyme Regis within the stores at Manchester Museum, prompted a reappraisal of the material to discern its nature. This reappraisal has shown the "cuttlebones" to be soft bodied coleoid cephalopods of the genus Phragmoteuthida, considered to be the ancestors to the modern squid Sepiida. Though their Phragmoteuthida affinity could be confidently identified the age of the species and stratigraphy remains unknown due to the poor preservation of the phragmocone, pro-ostracum angles, and the lack of data originally recorded in relation to the specimens.

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## Introduction

This paper describes two fossil coleoid specimens recently re-discovered in the collections of the Manchester Museum, to determine their affinity and the possibility of them being forgeries. The two specimens (L6809 and L6923) had been donated to the museum in 1905 and were labelled as "cuttlebones" and left within the basement stores at the museum until their re-discovery. The specimens are accessioned as being from Lyme Regis, with the L.6089 specimen noted as from the Lower Lias "somewhere near the top of A. bucklandi zone" and originally purchased for 4s/6d by D. Watson. Specimen L.6923 is labelled "from the Blue Lias", with the only other information noting the specimen as being "found in Dr Hoyle's room". Though precise stratigraphic origin is unrecorded, an educated guess can be made, based on the stratigraphy around Lyme Regis and the matrix material. In both cases age can be constrained to Hettangian to Sinemurian, from the Blue Lias member within one of the shale beds near the top of the member as indicated by Ammonites bucklandi within the notes.

Composites are common with older coleoid specimens, and thus care was taken to ensure the specimens studied were not composites, and that both the phragmocone and hooklets are part of the same specimen. The creation of large numbers of "well intended forgeries" made by both amateur collectors, to increase market value, and museum preparation staff,

to help current theories or improve appearance, have meant that numerous original specimens were of little scientific value (Donovan et. al. 1992). Original research by Owen, (1844) included composite material that he either failed to acknowledge or realise were composites; likely due to his theory that the hooklets belonged to the guards of belemnites rather than to a separate genus, as subsequent research has shown (Donovan and Crane 1992). The specimens originally studied by Owen, (1884) originated from the Oxford Clay formations, and are younger than the material from Lyme Regis, and were named Belemniteuthis. Jeletzky (1965) first proposed the order Phragmoteuthida, after Mojsisovics (1882) proposed the phragmoteuthid genus, Jeletzky then later published an exhaustive review (Jeletzky 1966) of belemnites and soft bodied fossil 'squid'. This new genera *Phragmoteuthis*; was reviewed by Doyle et al. (1994) with amendments to more recent discoveries. Other papers on coleoid cephalopods include Allison (1988), Doguzhaeva et al. (2007) and Kear et al. (1995) who discuss the taphonomy of the soft tissue preservation of coleoid found in the Oxford Clay. The research indicated francolite replacement of the weakly calcified (probably originally aragonite) parts such as the phragmocone, were as soft tissues such as the muscle fibres are usually preserved as phosphate or carbonate, often compressed, but not as a film, and showing a cross-hatched pattern. Together with mineral replacement of the chitin present both as structural support (within the mantle, muscle and the pro-ostracum) and composing complete structures (hook-

lets and beak). Other work on Phragmoteuthida and the Teuthida order includes Doyle (1991), Doyle and Donovan (1994) and Riccardi (2005), who greatly expanded the topographic and stratigraphic range of the Phragmoteuthida genera. Recent papers on the soft part preservation of Phragmoteuthida such as Reitner (2009) have added to the evidence, through gill morphology, that recent teuthids and the vampyromorphs are most likely decedents of the Phragmoteuthida.

Phragmoteuthid morphology is superficially similar to modern squid today, with a weakly calcified internal guard consisting of a shortened phragmocone (relative to belemnites) and a greatly elongated pro-ostracum contained internally, within the mantle musculature. Lukeneder (2005) and Jeletzky (1966) stressed that the narrow and shallow reentrant zones, which separate the median field of *Acanthoteuthis bisinuata* (Bronn, 1859) from what are called the lateral fields, are homologous not only to the median asymptotes of the Belemnitida, but are equivalents of their entire hyperbolar fields, including both the median and lateral asymptotes (within the pro-ostracum). Suess (1865) correctly concluded that the lateral fields of the phragmoteuthid pro-ostracum lie outside the hyperbolar zones of the Belemnitida and do not correspond at all to their so-called lateral fields (hyperbolar zones within this paper).

There has been a lot of work on the coleoid cephalopods from Lyme Regis and other areas. This began in the early part of the 18th century with Owen (1844); Pearce (1847); Huxley (1864); and Crick (1907) looking at *Belemnotherutis* when it was believed that the arm hooklets (often found isolated from any other remains) belonged to the hard calcified guards of belemnites. This theory persisted until re-descriptions by Mojsisovics (1871, 1882 and 1902) under a different name and Jeletzky (1946, 1958, 1964, 1965 and 1966) in 1964 giving the genus its current name, re-descriptions of new and old material by Donovan (1977), Donovan and Crane (1992) and Donovan (2006) provided evidence for previous fakes and better definition of its taxonomy.

## Systematic Palaeontology

### (M.M.) L.6923 (Figure 1)

Order: Phragmoteuthida Jeletzky 1964  
 Family: Phragmoteuthidae Mojsisovics 1882  
 Genera: Phragmoteuthis Mojsisovics 1882  
 Species: *Phragmoteuthis conocauda*

Locality: Lyme Regis, Dorset  
 Horizon: Blue Lias shale bed (bed unknown)  
 Type specimen: *Acanthoteuthis bisinuata* Bronn 1859  
 Type locality: Lyme Regis, South East England  
 Type horizon: Blue Lias



Figure 1. Specimen L6923 scale in cm showing striations running parallel to the length of the hooklets (top left), structural colour in the pro-ostracum, and pale patches on the matrix from preparation to remove surface contamination.

## Diagnosis

The hooklets and age of this specimen are indicative of *Phragmoteuthis* Jeletzky (1966) as is the appearance of the specimen as a whole (see Reitner (2009) for comparison); however due to the poorly preserved pro-ostracum the species can only be inferred (Donovan 2005, Doyle *et al.* 1994 and Donovan 1977).

## Description

This specimen is approximately 30 cm long and 7 cm at its widest but this cannot be considered to be the full length, as the distal ends of both the phragmacone and hooklets cannot be seen. The specimen is composed of parts of the pro-ostracum and phragmacone, hooklets and buccal mass (Figure 1).

### Arms and hooklets

The hooklets are three-dimensional and occur singly; or in pairs, their size ranges from 0.5–4 mm. The broken hooklets show a pale white to dun coloured core and a dark black outer layer. The paired hooklets show that pairs usually consist of a long gentle curved hooklet with a bifurcated base together with a much shorter and robust triangular hooklet. The extent of paired hooklets is around 7 cm (Figure 1) but the full extent of the arms in life position would have been longer as not all of the hooklets are preserved and through previous work (Donovan 2006) it has been shown that the hooklet type changes along their length (Figure 2C). Hooklets that are preserved are not those that are indicative of the terminal end of the arms. Only 2 of the 10 arms can be constrained (though their distal ends are still missing) by paired hooklets though at least 5 can be inferred from other hooklets, which are visible on this specimen. Other types of hooklets which can be seen are much smaller (less than 0.5 mm) than the ones with the bifurcated base and have a more triangular form with a wide base, and are present at the base of the arms close to the buccal mass see below.

### Pro-ostracum and phragmacone

The pro-ostracum and phragmacone are only partially preserved and are heavily crushed and partially disaggregated. They cover an area approximately 8 cm long and 6 cm wide with the largest pieces being <3 cm (Figure 1). They exhibit iridescence in places on the lower of the two layers of which they are composed where the upper dull dun coloured surface has been removed. The colouration of these fragments indicates possible preservation of the original aragonite or replacement to francolite, a complex Ca phosphate (Doyle 1991). In the middle of the fragments is the ink sac that is partially covered by the pro-

ostracum fragments and it is not preserved intact. The proto-conch and siphuncle are not preserved.

### Buccal mass

The buccal mass in this specimen is a long narrow mass connecting the pro-ostracum and the hooklets and is comparatively large, around 12.5 cm long and 1.5 cm wide on average widening to 3–4 cm wide and up to 3 mm thick towards the arms and hooklets (Figure 1). The mass has a dark colour and is composed of remains of the organic material and carbon originally present within the muscles. The buccal mass widens to around 3.5 cm just behind to the hooklets, which could represent the increased muscle mass associated with the beak of the animal. Also present within the narrow part of the mass just in front of the pro-ostracum is what appears to be the ink channel. There are striations present surrounding the hooklets, buccal mass and pro-ostracum and could represent the remains of either muscle fibres or part of the mantle. These striations are aligned parallel to the length of the specimen and extend for up to 2 cm perpendicular from the specimen and are clearly not a feature of the matrix but strongly associated with the specimen, and could represent mantle tissue.

## Remarks

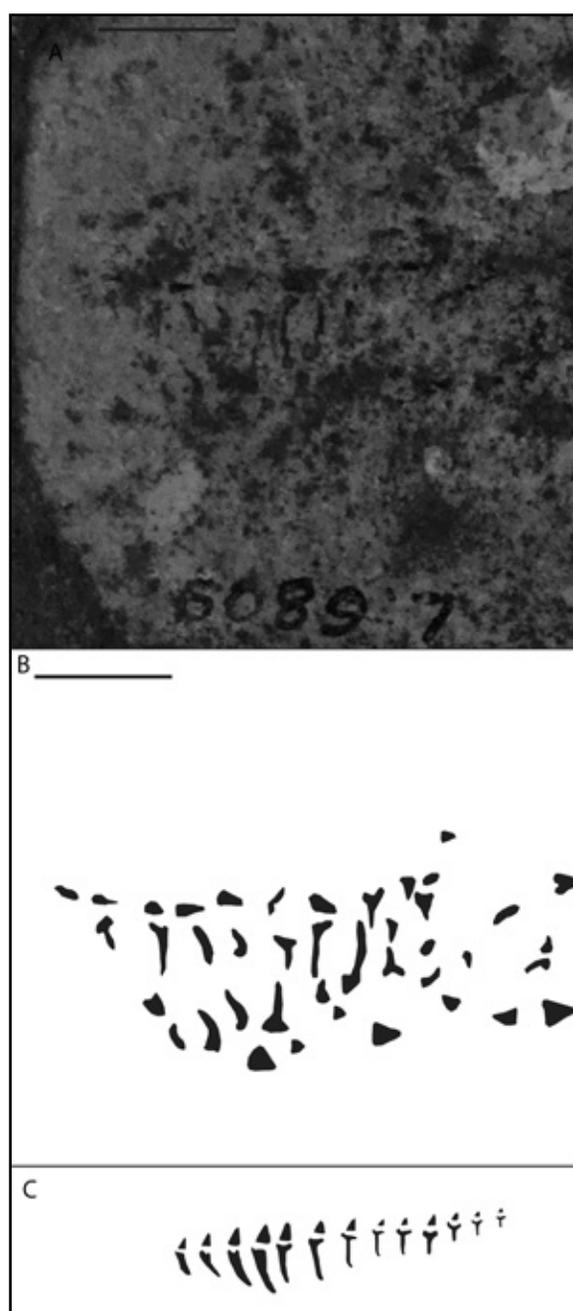
Although the original description of this genera by Jeletzky (1965) based the separation of the species on the differences in the pro-ostracum and angle of the hyperbolar zone, the hooklets and the age of the specimen together with similarities between this and other specimens which have been preserved in 3D Reitner (2009) show that the positions of the hooklets, buccal mass, their size and appearance together with the area of the pro-ostracum are the same (Figure 1), so it is safe to assume that this specimen belongs within the *Phragmoteuthis* genus and that the species is most likely *Phragmoteuthis conocauda* when compared to that shown by Reitner (2009). The large buccal mass could also represent the remains of the chitinous oesophagus lining seen in some modern day teuthids (Kear *et al.* 1995) but further testing of the buccal mass would be required.

### (M.M.) L6809 (Figures 2, 3)

Order: Phragmoteuthida Jeletzky 1964  
Family: Phragmoteuthidae Mojsisovics 1882  
Genera: Phragmoteuthis Mojsisovics 1882  
Species: *Phragmoteuthis* sp.

Locality: Blue Lias, Shale bed (top of A. Bucklandi zone)

Type locality: Lyme Regis, South East England  
Type horizon: Blue Lias



**Figure 2.** Close up of specimen L6809 (A) with an overlay showing the position of the hooklets (B) and an idealised section showing the orientation of the hooklet pairs in life position (C). Scale in cm

### Diagnosis

This specimen has the same hooklets and preservation style as L6923. The age and bed in which it was found were not noted down together with the I.D. number, so its placement within the Blue Lias cannot be confirmed.

### Description

#### Hooklets and arms

The hooklets show a dark black surface with a vitreous shine; in places the hooklets are broken to reveal a pale white core. They are 0.5-4mm in length show-

ing at least 2 clear pairings which define arms (Figure 3). There are also numerous other isolated hooklets indicating further arms which had partially decayed and whose hooklets have disassociated.

There are 2 arms clearly defined by paired hooklets, and another 3 inferred arms from the isolated hooklets.

#### Pro-ostracum and phragmacone

The pro-ostracum and phragmacone are indistinguishable from each other and are heavily crushed and partially disassociated. They show iridescence on the lower of the two surfaces that can be seen; the upper surface shows no bright colours and is a pale, matt dun colour. The area covered by the fragments is similar in size to L6923 and is around 7cm long by 3cm wide, but this is unlikely to be the full extent of the fragments as the terminal end of the phragmacone has been broken off and re-glued back into place (Figure 3). As the alignment of the pieces is off, it suggests some of the phragmocone could be missing between the two pieces. The broken piece does appear to have been from this specimen originally as the colour, structure, size of the pieces and preservation style all match that of the rest of the specimen.

The soft part preservation, though limited, does show evidence for muscle fibres on the pro-ostracum and just behind the hooklet crown, with a patch of cross hatched white fibres.

### Discussion

There is a large difference in size between the buccal masses of L.6923 and L.6809 and the absence of any gaps or breaks between the arm crown and pro-ostracum shows that this difference is genuine. This would suggest that the two specimens are different species of the *Phragmoteuthis* genus, with the L.6923 specimen closely resembling *Phragmoteuthis conocauda* (Reitner 2009) and the L.6809 specimen an unknown *Phragmoteuthis* sp. Unfortunately the species level identification cannot be confirmed for L.6923 as the identification relies on the angle and appearance of the pro-ostracum which is too damaged for such identification.

The habitats which would most favour these animals are discussed by Reitner (2009), who showed that the gills of this animal were more likely associated with a the fast pace of some modern *Vampyroteuthis*, and would likely inhabit highly productive near-surface waters where it would have been preyed upon by ichthyosaurs and other large predators (Jeletzky 1965; Pollard 1986 and Valente *et al.* 2010).



Figure 3. Specimen L6809 scale cm showing a break between parts of the pro-ostracum on the right and a patchy black surface contamination present on the matrix.

## Conclusion

Despite a lack of specific locality information with the specimens, the age and locality are most likely constrained to Hettangian within the Blue Lias. From the appearance, location, age and hooklet morphology both specimens are identified as belonging to the *Phragmoteuthis* genus. Specimen L.6923 is most likely *Phragmoteuthis conocauda*, and specimen L.6809 *Phragmoteuthis* sp., neither however can be confidently confirmed to species level due to the poorly preserved pro-ostracum.

## Acknowledgements

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## LOST & FOUND

Enquiries and information, please to Matthew Parkes, (National Museum of Ireland - Natural History, Merrion Street, Dublin 2, Ireland; e-mail: mparkes@museum.ie). Include full personal and institutional names and addresses, full biographical details of publications mentioned, and credits for any illustrations submitted.

The index to 'Lost & Found' Volumes 1-4 was published in *The Geological Curator* 5(2), 79-85. The index for Volume 5 was published in *The Geological Curator* 6(4), 175-177.

### Abbreviations:

CLEEVELY - Cleevely, R.J. 1983. *World Palaeontological Collections*. British Museum (Natural History) and Mansell Publishing Company, London.

GCG - *Newsletter of the Geological Curators' Group*, continued as *The Geological Curator*.

LF - 'Lost & Found' reference number in GCG.

### 267. Found in the Fossil Fish Collection of the Natural History Museum Palaeontology Section

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<sup>2</sup>, Queensland Museum Geosciences, 122 Gerler Road, Hendra, Queensland 4011, Australia, currently c/o Natural History Museum Palaeontology

In December 2011, one of us (WI) was searching the Natural History Museum, London Palaeontology Department Fossil Fish collection for specimens of

the shark *Edestus* to compare with material found in USA. Within the UK institution's collection of edestid teeth remains, Wayne found a specimen, NHM P.16195, labelled as "*Edestus*" sp. recorded as from the Lower Devonian Hunrückschiefer from near Bundenbach in the Rhine Valley, Germany.

The specimen (Fig. 1) is circular in outline and about 5 cm in diameter. The label and register confirm that it was sold to the NHM Geology Department in 1932 by Gustav Korff (does anyone have any information about him?). We presume that Korff made the identification of the specimen but it came to the collection

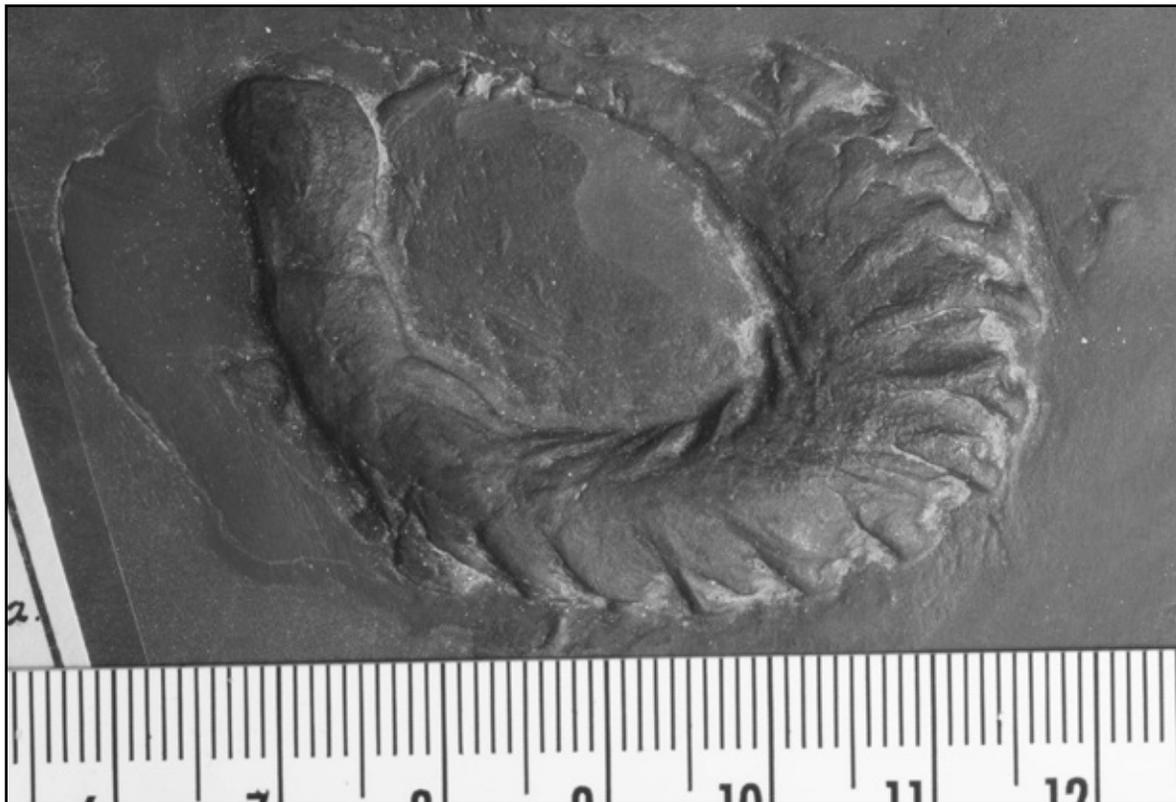
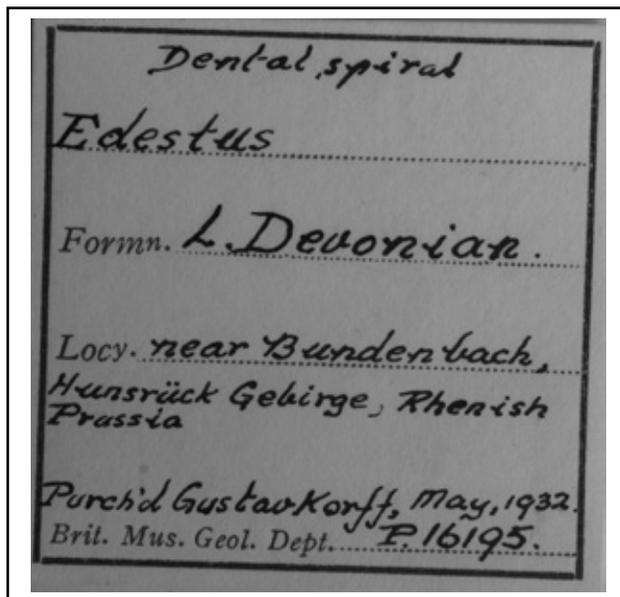


Figure 1. Photograph of the specimen NHM P.16195 in colour, with a cm scale.



Photograph of Specimen Label.

during the early phase of Errol White's time as fossil fish expert.

The purchase of the Hunsrückschiefer "Edestus" was noted in News from the NHM in *Nature* (Anon, Acquisitions, June 4, 1932 p. 824). It's clear that the author of the note did not distinguish between *Edestus* and *Helicoprion*, which are actually quite different and other than this specimen only known from the later Palaeozoic (Carboniferous and Permian). Either one in the Early Devonian would have been noteworthy but until now no subsequent author has questioned the designation (e.g. Zangerl 1981).

### Interpretation

WI conferred with the second author (ST), then working at NHM. Both agreed that this specimen was not *Edestus* nor even any part of a fish. There are fish remains in the Hunsrückschiefer but they are agnathans, unusual placoderms and one possible early shark. Our first idea was that this German specimen was a trace fossil, perhaps a feeding trace or possible arthropod squashed at an odd angle. A consensus now agreed with Palaeontology staff (Zerina Johanson, Greg Edgecumbe, Andrew Smith), is that this specimen is not vertebrate and possibly a trace fossil; an x-ray should be made.

We would like to hear from curators to see if they have specimens such as this from the same locality.

### References

Zangerl, R. 1981. Chondrichthyes I Paleozoic Elasmobranchii. In Schultze, H-P., ed. Handbook of Paleoichthyology Vol. 3A. Gustav Fischer Verlag, Stuttgart, New York vi + 115 pp.

## 268. Tertiary collections of the Rev. John Hawell

Ken Sedman. Email: ken.sedman@gmail.com.

I have now retired from my post as curator of the Dorman Museum and so find myself with time to pursue my own research into it's collections - something I wasn't able to do from about 1998 onwards. I am cataloguing the Tertiary collections of the Rev. John Hawell which came into the Dorman in 1904. Hawell received specimens from all over the world but especially other parts of Britain, France and America and he was very good at recording who sent them - there are many prestigious names.

However, I have come across a number of specimens that he hasn't catalogued and are still in their original matchboxes. They are all from Barton, Hampshire and probably date from around 1900 (Hawell's collections are mostly 1890-1904 when he died).

I wonder if you could circulate a picture of a match-box label to your GCG members in the hope that they may be able to identify the collector?



Hawell's named collectors of Barton material are:

R. Charles (assumed to be C. Rickman)

R.F. Damon

John T Day

C.T. Hinuber

A.E.S. (assumed to be A.E. Salisbury?)

The material could belong to any one of them or an entirely different collector. The results of the documentation of this Tertiary collection will be circulated to all relevant institutions in due course.

# GEOLOGICAL CURATORS' GROUP

## 37th Annual General Meeting

An 'AGM' was originally held at the Ulster Museum in December 2010, but due to severe weather many people did not manage to get to the Seminar as planned, and the 'AGM' was subsequently deemed inquorate.

**Emergency General Meeting of the Geological Curators' Group, Geological Society of London, Burlington House, Piccadilly, London, 19th January 2011.**

### 1. Apologies for absence.

Kate Andrew, Owen Baker, Stuart Baldwin, Hilary Blagborough, Hannah Chalk, Beris Cox, David Craven, Peter Crowther, Adrian Doyle, Paul Ensom, Helen Fothergill, David Gelsthorpe, Dale Gnidovec, P Wyse Jackson, Sarah Kenyon, Susan Martin, Steve McLean, Nigel Monaghan, Alan O'Connor, Derek Siveter, Vicky Tunstall, Sue Turner.

### 2. Acceptance of the minutes of the 36th AGM - Great North Museum, Newcastle.

Agreed as correct.

### 3. Matters arising.

6. Treasurer's Report. Cindy Howells has a list of Institutional subscribers for members to consult. Please contact Cindy Howells direct.

### 4. Chairman's Report.

#### 1. Correspondence.

Bob Draper (University of Bath) contacted me earlier in the year concerning an obituary being written for Ron Pickford (Bath Royal Literary and Scientific Institution).

#### 2. Collections at risk.

GCG has responded to issues at a number of establishments and local authorities, including Bristol, Kendal, The Yorkshire Museum, Northampton, Manchester Bolton and Rochdale.

There has been a suggestion from the Committee that GCG should consider drawing up a strategy so we can respond to similar cuts or collection disposals - a document outlining the important work and skills of specialist curators, perhaps drafted in conjunction with other specialist curator groups, which can be sent to council decision-makers as a position statement. It was suggested that we work with NatSCA

and possibly specialist archaeology groups. This is underway.

In the past few years we've seen a substantial increase in funding for a select few museums and a subsequent increase in staff, but we now face the prospect of funding cuts and staff reductions back to a level seen at the time of the "Doughty Report". However, the need for advocacy and proactive support for colleagues facing the future is perhaps exacerbated by the changed face of the museum sector as a whole, as more posts have been created and relied upon in areas such as marketing, audience development, learning, exhibitions etc. the role of the traditional subject specialist curators becomes harder to fight for when it is not seen as public facing or "essential". In the next few months the GCG, along with other subject specialist groups, needs to consider how best to respond to these changes, many of which are not through the choices of the funding authorities, and propose positive resolutions to these universal problems that will place us in the best position to protect collections, staff, expertise and prepare for the future.

#### 3. Web / email distribution developments.

The jiscmail circulation list is growing, and I would encourage anyone to join up and use it. It is a great way to get opinions and answers to problems quickly, or to get in touch with colleagues.

I would also like to take this opportunity to thank Hannah Chalk for all her work on developing the website in the past year. Web Officer is one of the posts we would like to propose as an official committee post in the coming years.

#### 4. Constitution.

The Committee is considering a number of changes to the constitution of the GCG and will plan to present them at the 2011 AGM. The following changes have been discussed at committee meetings, but we would like to know what you think or if you have any other suggestions for changes.

1. Establish Membership Secretary and Web Officer as full committee posts, rather than co-opted posts.
2. Change Recorder to Collections Officer, with a remit to monitor and support collections at risk,

rather than being the responsibility of the Chairman.

3. Change the arrangement of ordinary committee member posts from 4 posts, 2 in year one & 2 in year two to run for 2 years each; to 3 posts, each to run for a maximum period of 3 years serving in 3 year cycles.

Committee are also considering allowing Honorary members full voting rights. The Charity Commissioners and the Geological Society of London must agree any amendments.

### **5. Committee.**

My thanks go to all the Committee members who have committed so much work to support the activities of the GCG over the past year (and indeed over the past 3 years!).

Unfortunately, Lyall Anderson had to leave the Committee due to ill health earlier in the year and he has been missed. We hope, however, to welcome him back in the future should he feel the urge to get involved again.

The Committee would encourage anyone who has an interest in becoming involved in GCG to consider submitting a nomination for a post on committee. If you are struggling to find nominators, or are trying to decide whether Committee is for you, please contact any member of the current Committee who will be happy to help and advise. Travel expenses for Committee members can be reimbursed if required, but we would hope that your employer would support you allowing you to attend during work time. Report accepted.

### **5. Secretary's Report.**

2010 saw a range of enquiries and monitoring of collections at risk. I co-ordinated GCG's response as we heard about the large number of cuts and restructures. I will try to ensure GCG responds swiftly to the cuts which are still to come.

I have been working with various committee members to put together a bid for funding a Natural Sciences Subject Specialist Network, in partnership with NatSCA. The network is intended to provide support to people working with natural science collections, through web-based resources, which build on previous projects such as FENSCORE. We have received favourable comments back from the MLA, but the future of the application is dependent on MLA funding allocations in 2011.

Report accepted.

### **6. Treasurer's & Membership Secretary's Report.**

We end the year slightly down on our balance of the previous year. However, this is not a cause for any alarm - instead it is the result of a conscious decision by committee to use some of our resources, first to subsidise the Street Conference, and secondly to publish the conservation/preparation papers presented at SVP in Bristol in 2009.

Subscriptions are up from last year. Once again we are indebted to Cindy for her tenacity in chasing late payers. We made a small loss on workshops. Thanks to Steve McLean for reducing this loss to manageable proportions. Gift Aid is slightly down on the previous year, mainly due to many members paying their 2010 subscriptions after the April deadline for Gift Aid; it will hopefully increase again next year. Final accounts for the Street Conference are still not in, but when the final two cheques have been received, we will end up having subsidised this conference by approximately £200, which is considerably less than we had originally estimated. This is due to an anonymous donation of £500 towards the cost of the conference, for which we are extremely grateful.

Expenditure on Geological Curator is normally approximately £1,000 per issue. Last year's figure was inflated by our publishing three parts instead of our normal two. This year's figure is inflated due to our decision to publish the SVP papers, which has resulted in the recent bumper issue of Vol. 9.3. Many thanks to Matthew for his extra work in producing this very useful publication.

Coprolite expenditure continues to average around £500 per issue.

The American dollar account stands at \$ 2,327.42 (\$2,111.42 last year), and the European account stands at 202.44 (93.67 last year). I record my thanks to Tiffany Adrain and Matthew Parkes for looking after these respective accounts, and to Caroline Buttler (NMW) and David Green (formerly Manchester Museum) for their willing auditing of the accounts. Membership for 2011 is now due and we will be happy to accept payments at this meeting.

### **Membership Secretary's Report.**

Personal UK	169	(171)
Personal Overseas	18	(16)
UK Institutions	53	(56)
Overseas Institutions	28	(27)
Honorary	7	(8)
<b>Total</b>	<b>275</b>	<b>(276)</b>



This year we have had five new personal members and two institutions, but there have been slightly more cancellations, so that we have ended up with just one less in total. This seems to be a continuing trend with several museums having lost curatorial posts, and personal members retiring. Once again I urge you all to promote the group and its activities whenever you can, and encourage relevant institutions in your area to join. Let me know if you would like to see the list of which institutions are members. There are still 17 people who have not updated their Standing Orders from the last raise (in January 2007), and these will once again be invoiced for the outstanding balance. If you pay by Standing Order please take time to check that this is still in effect, and for the correct amount. Also, could I please ask that you let me know whenever you change address or job so that we do not send your copy of the journal to the wrong place.

#### **Question from the floor.**

Roy Clements: Is GCG doing any recruitment of amateur collectors, particularly those who may have collections?

Reply from Tom Sharpe. We are updating the membership leaflet and this will go some way to increasing our profile with all interested parties.

Report accepted.

#### **7. Programme Secretary's report.**

Two seminars (including the AGM in December), one workshop and a presence at the SVPCA/SPPC meeting in Lyme Regis are planned.

Fifteen people attended the Digital workshop held at the BGS in Keyworth. A number of GCG members attended the Third International Palaeontological Congress in London, and the GCG seminar in Street was well attended.

Due to poor take-up, the GCG Study Tours have been dropped from the programme.

Report accepted.

#### **8. Journal Editor's report**

In 2010, Volume 9 No 3 was issued in September, comprising a thematic set of papers on "Fossil preparation: tools, techniques and projects". These arose from the SVP/SVPCA/SPPC meeting in Bristol in 2009. Additional copies were printed and the page numbers exceeded a 'normal' issue, but it is hoped to recoup some of the additional costs in extra sales and some new memberships, primarily from North America and SVP members.

The second part for 2010 (Vol. 9 No. 4) is unfortunately delayed. The issue will comprise a 'Hugh Miller special', with three papers and two facsimile reproductions with commentary. Parts have been received and it is expected that the issue may be completed within weeks for probable February printing and distribution.

Volume 9 No 5, the first part for 2011 is on target for an April publication date. It will comprise papers from the 3rd International Palaeontological Congress Session 5 on palaeontological collections co-convened by GCG with Sarah Long of the NHM. Several papers are in review or revision, and others are expected by end of January with quick turn-around planned for them. Although still a 'special' it will not contain as many pages as Vol 9 No 3 as some authors have not been able to commit to the publication.

I expect Vol. 9 No. 6 in the autumn of 2011 to be a 'normal' issue and am seeking papers for that at any time. There will be AGM minutes, Brighton medal citations, obituaries and other material to be included in this or earlier issues.

#### **9. Newsletter Editor's report.**

No report received.

#### **10. Recorder's Report.**

The main duty of the Recorder in recent years has been the compilation of the State and Status Report, most recently published in 2005, based on questionnaires sent out in 2001. This was intended to be compared with the first report (Doughty, 1981). Because of the intermittent nature of this duty, committee discussions during 2010 have considered the possibility of broadening the role and renaming it "Collections Officer".

At the request of the Committee, I have looked at a possible permanent home for the GCG Archives. The British Geological Survey and the Department of Museum Studies at Leicester were suggested. If Leicester were chosen, the material would be deposited in the University Library Archive. Committee need to draw up a retention schedule and sort the archives against this in order to understand better its breadth and volume. Leicester University would require this information before taking a decision, and the retention schedule would assist Officers when disposing of paperwork.

During 2009 - 2010 there have been various national and international initiatives to investigate UK speci-

men collections, particularly of biological material, with a view to improving efficiency. These included studies by ERFF (The Environmental Research Funders Forum), and NERC (The Natural Environment Research Council). I have continued to stress the importance of museum collections and the existing organisations for consultation.

Report accepted.

#### **11. Election of Officers and Committee for 2011. Election of Auditors.**

Three nominations for Ordinary Committee members had been received. Jon Radley and Owen Green were appointed. Michael Howe has been nominated as Chairman. Agreed.

All other Committee members, Officers and co-opted members are willing to continue in post.

The meeting now welcomed Mike Howe to chair the remainder of the meeting.

Mike Howe thanked Tom Sharpe for chairing the bulk of the meeting in the absence of the outgoing Chairman.

#### **Election of Auditors.**

Caroline Buttler is willing to continue as an Auditor. Replacement needed for David Green. No nominations received. May need to co-opt someone in the short-term.

#### **12. Any other business.**

1. *Guidelines for the Curation of Geological Materials, 2nd edition.* Matthew Parkes reported that work continues on this publication. The Guidelines will be accessible from the GCG website.

2. *Future GCG projects.* Mike Howe. Possible projects for GCG to take up in the next year or two include:

1. Encouraging amateurs to join GCG.
2. Data basing of collections and developing web access to multiple databases. Suggestions of people to help with these would be welcomed.

#### **13. Date and venue of next Annual General Meeting:**

6-7th December 2011, Leeds City Museum, Discovery Centre.

## BOOK REVIEWS

**History and mystery - notes and queries from newsletters of The Society for the History of Natural History. Nelson, E.C. (ed). 2011. The Society for the History of Natural History. 200pp ISBN 978-0-901843-09-8 £15**

This entertaining volume is a celebration of its seventy five years by a society founded in 1936 and its newsletter that was started in 1977. The newsletter carries notes that might be considered snippets in a lesser periodical, but the authors are knowledgeable historians of science. While most entries are less than a page they tease out fragments of natural history, mainly through the personalities who collected, studied and published in the last two centuries. It is a volume to dip into for quirky tales of fieldwork such as Joseph Dalton Hooker's elephant back rides in the Himalayan foothills. From a field trip in 1897 to the Antrim Coast we learn of the unpublished poetic summary describing the end of the foray, gleaned from handwritten notes in a journal offprint:

Then they quitted Ballycastle, in the bally Irish Mail,  
Which goes a bally mile an hour, like a bally Irish snail,  
And they stopped at Ballymoney, & they had a bally drink,  
And they reached Belfast quite sober, whatever you may think.

The entries are grouped in themes, connecting eccentric hobbies and paid employments (of course making the logical assumption that being a naturalist is the sensible aspect of someone's life). There are many biographical glimpses of well known and barely known naturalists, the newsletter acting as a serious research tool in tracking down numerous amateurs who otherwise might slip through the cracks. They were not considered worth of obituaries in the scientific publications at the time, and all that is known may be a surname or their home town. In what other collection of notes would I learn to my benefit that there was a list of the zoological collections in Ireland in 1844 extracted from a newspaper the *Newry Telegraph*? These include a number of significant small museums that had escaped my notice over thirty years as an Irish museum curator.

The unravelling of our museum collections and the people behind them is a slow process, relying on serendipity. This useful and unusual compilation is not only enjoyable but a valuable collection of over thirty years of joining dots and unearthing treasures. The book is being used to raise funds for the society and curators should consider buying a copy online at [www.shnh.org.uk](http://www.shnh.org.uk)

*Nigel Monaghan  
Keeper of Natural History, National Museum of Ireland -  
Natural History.*

**Evolution of Fossil Ecosystems  
Paul Selden and John Nudds  
2nd Edition  
£29.95  
2012. 288 Pages, Paperback  
ISBN: 978-1-84076-160-3 - Manson Publishing**

In this new and updated second edition of "Evolution of Fossil Ecosystems" Paul Selden and John Nudds have revised the original 14 chapters from the first edition, adding up-to-date research and new interpretations of these Fossil-Lagerstätten sites. However, this revised edition is not just an update of the first edition: the authors have added 6 new chapters - expanding the book by over 100 pages and with nearly 200 new images.

The second edition follows the same general layout as the first, by initially introducing what Fossil-Lagerstätten are, the different types (Concentration and Conservation), and what they can tell us about the evolution of life on Earth. The chapters each focus on a particular Fossil-Lagerstätte, from the oldest to the most recent in geological time. These again follow a similar layout to the first edition, with each chapter split into several sections including: Background, placing the site in context, History of Discovery, Stratigraphic Setting and Taphonomy, Description of Biota, Palaeoecology, Comparison with similar age deposits, and in a change from the first edition, Museum and Sites, which was previously in the appendix.

Each chapter is illustrated with full colour diagrams, including locality maps and stratigraphic columns, with images of the locality, spectacular fossils and occasional reconstructions of the animals in life. The images have measurements written in the figure caption - in both metric and imperial - however the additional inclusion of a scale bar would perhaps have helped to gain a better visual appreciation of the fossil size. The further reading section has been moved from the end of each chapter and placed in a combined alphabetical reference list at the back, making it more time consuming to look up references for specific sites. Other minor changes in this edition include a toned down colour scheme for the chapter headers - gone is the bright orange of the first edition, replaced by a more subtle pastel orange. The text is also laid out clearer, giving a less cluttered appearance on the page than in the first edition, and making it easier to read.

The Fossil-Lagerstätten include the 14 from the first edition: Ediacara, Burgess Shale, Soom Shale, Hunsrück Slate, Rhynie Chert, Mazon Creek, Grès à Voltzia, Holzmaden Shale, Morrison Formation, Solnhofen Limestone, Santana and Crato Formations, Grube Messel, Baltic Amber and Rancho La Brea. The new chapters detail the Cambrian locality of Chenjiang in China, the Silurian Herefordshire Nodules, UK - illustrated with the beautifully detailed computer reconstructions of the invertebrate fauna, three formations within the Karoo

Supergroup of southern Africa, spanning the Permo-Triassic extinction, and the Lower Cretaceous Jehol Group of China, including spectacularly preserved feathered dinosaurs; further Cretaceous sites are included from Spain (El Montsec and Las Hoyas), which have abundant fossil insects preserved. The last of the new chapters is on the late Eocene-early Oligocene White River Group, USA - famous for its beautifully preserved fossil mammals.

The book is very well written and beautifully illustrated with stunning colour photographs and informative diagrams. There is excellent coverage of sites worldwide and through geological time, covering almost all of the major periods. The text is jargon-free and light on technical terms, therefore appealing to a wide range of people including amateur enthusiasts, students and professionals. Museums with collections or displays from any of the sites listed in this book would benefit from having a copy of "Evolution of Fossil Ecosystems" and it would be an excellent choice to stock in the gift shop allowing visitors to learn more about these exceptional fossil sites.

*James E. Jepson*

*Department of Geology, National Museum of Wales, Cathays Park, Cardiff, Wales*

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**Introducing Palaeontology - A guide to Ancient Life. Patrick Wyse Jackson. Published September 2010 by Dunedin Academic Press Ltd. £9.99/ 13.99/ \$16.99, paperback, 160 pages, illustrated in full colour throughout. ISBN 978 1 906716 15 8**

A big part of my job, and one that I rate as very important, is identifying fossils and rocks for members of the public who find their way to the museum in person. Often those who use emails, phone calls or post to contact us find that their initial enquiry demands a personal visit. Experience shows that many of the fossils brought in, by both children

and adults, are often very mundane to the jaundiced eye, but can be full of interest for the person. They are often their first real encounter with palaeontology at all.

I find that this book is the one I keep at my desk and immediately pull out to show an enquirer what their fossil represents, especially in the case of incomplete specimens. Crinoid ossicles are quickly explained for example, by showing them figure 68, with both drawing and photograph of the crinoid animal. Similarly for graptolites, an ill-defined saw tooth trace on a grey slate can be rapidly explained by showing the diagrams on page 111. The combination of text, and illustrations by John Murray are a great introduction to any animal group. Vertebrates are included, with the comparable level of coverage for each group with the invertebrate phyla, and no undue emphasis on mammals or hominids, correctly so in an introductory book for the whole discipline.

In Part 2 of the book, every phylum is well explained in very readable, plain language, with technical terms included in a glossary and visually marked in bold font. However, most are better explained in the diagrams and illustrations which are an excellent feature of the book. A well-chosen mix of photographs, drawings and cut-away diagrams bring out all the critical features that you would want to show to any person with a new interest in fossils. It works equally well, I would suggest, for third level students in the early stages of a geology course or other Earth science varieties.

Part 1 is more than one third of the book and is a comprehensive, yet very focused tour of the science of palaeontology, including preservation, collecting, curation, taxonomy, and sensible collecting guidance for a would-be palaeontologist. A significant chunk of this section explores the uses of fossils, tackling palaeobiology, evolution and extinction, biostratigraphy, and environmental data from fossils in clear language with good examples to illustrate the point being made. A chapter on lagerstätten very briefly notes most of these important sources and their faunas, and a brief review of how fossils have been seen through history rounds off Part 1.

In summary, this book is one I already recommend to our museum's public enquirers. If you had room for only one book on palaeontology in your museum shop, this is the one I would suggest you stock. It is attractive, well written and illustrated and reasonably priced. It meets most of the needs of those with an interest in fossils, from very first encounters, through to university level.

**Introducing Volcanology - A Guide to Hot Rocks. Dougal Jerram. Published October 2011 by Dunedin Academic Press Ltd. £9.99/ 13.99/ \$17.99, paperback, 126 pages, illustrated in full colour throughout. ISBN 978 1 906716 22 6.**

A thorough read of this book has reinvigorated my interest in volcanoes and volcanic rocks. It is very well written, very well illustrated and presents the information in an

engaging and authoritative manner. The language is concise, clear and plain, and could provide inspiration for a curator trying to develop informative exhibition texts in an accessible form.

The author's direct involvement in specific volcanic studies, including for example, the LIDAR laser scanning of Ethiopia's Erta Ale lava lake is mentioned here and there, but not trumpeted. This personal perspective does enhance the text and the illustrations throughout. For this reader, it helped make the chapter 9 on monitoring volcanoes the highlight of the book, but perhaps it was also because the content was completely new to me. Since my own student days, monitoring has transformed and I learnt from this book of a vast array of new technologies for keeping an eye on what a volcano is doing.

All of the chapters are interesting and readable though, and after a great introductory chapter, the topic of how rocks actually melt is tackled, providing me with fresh insights to rather woolly geological ideas tucked away from past study. Volcanoes and plate tectonics are admirably covered in chapter 3, with other planetary examples also explored a little. The core of the book lies in four chapters tackling Types and scales of eruptions; Lava flows and bubbling cauldrons; Explosive pyroclastic eruptions and their deposits, and Igneous intrusions - a window into volcanic plumbing. Each is very readable, with good illustrations doing much of the work, reinforcing rather than substituting for words. Global examples are given, although I felt that just a few more geological older examples would have been beneficial. The role of a volcanic geologist in unravelling older stratigraphical successions is really only hinted at in the book, and a good case study over a page or two would be a worthwhile addition to a second edition.

The last three chapters, covering Volcanoes, life and climate; Monitoring volcanoes and Volcanoes and Man all address human relationships with volcanoes and provide much food for thought. The analytical nature of scientific study is brought out and the room for theories remaining as such until hard evidence is gathered are delivered well. The need for continued research and ongoing monitoring is well argued. As with other Dunedin 'Introducing' titles, more technical terms (highlighted in bold where they occur) are explained in the text, but fully supported by a glossary.

It is hard to fault this book and I would recommend it highly for use by geological curators, for museum shops and for a very wide range of others.

**Introducing Geomorphology - A Guide to Landforms and Processes by Adrian Harvey. Published 2012 by Dunedin Academic Press. £9.99, 13.99, \$17.99, paperback, 124 pages, illustrated in full colour throughout. ISBN 978-1906716-32-5.**

Geomorphology has changed considerably since my own student days, so much so in fact that I am going to count

reading this book as a contribution to my Professional Geologist Continuing Professional Development. Glacial, fluvial, Aeolian and coastal processes and landforms are all here, but no longer in their separate chapters. The entire book takes a hierarchical scale based approach to the process systems and landforms embraced by geomorphology. After an introductory chapter, the author looks at global scale geomorphology, including plate tectonic contexts and global climatic contexts behind Quaternary changes. It was stimulating for me to see the global extent of both modern and Pleistocene features in a simple figure, since my own interest in and understanding of glacial geology has been very parochial to date.

The third chapter then takes a regional scale perspective, looking at structure, drainage networks and the evolution of regional scale landforms. The geomorphology of Western Europe is dissected as an example in a 'study box' approach. The bulk of the book is in chapter 4, looking at local scale geomorphology in process systems and landforms. Here one reads about weathering, slope processes, fluvial systems, aeolian systems, glacial systems and coastal systems in a more detailed fashion, but with an emphasis perhaps on the processes and their interactions rather than simply categorising landforms according to their origins.

A brief chapter 5 looks at timescales of landscape evolution and a useful coverage of relative and absolute dating methods in geomorphology. Two practical examples from the authors' own research groups are presented as case studies, usefully linking many aspects of the book as well as the chapter topic. The last chapter is a brief discussion of geomorphology in society, both in applied work and how it stands in education and research, essentially in Britain. A personal selection of useful further reading and websites is also provided. In common with other Dunedin 'Introducing' titles, more technical terms (highlighted in bold where they occur) are explained in the text, but fully supported by a glossary.

I found this to be an excellent modern introduction to geomorphology and learnt much from it. The one criticism I would have is that I found many of the photographs to be reproduced at too small a size to fully illustrate their point. I think a great many of them deserved to be bigger in size, and a good number of them would have benefited from the discreet insertion of arrows or dashed lines to annotate the features as described in the captions. Equally, the approach used in the case studies, such as the Howgill Fells (see Figure 5.1), with an interpretive sketch alongside the photo would be most welcome.

Notwithstanding this criticism, I would recommend this book to any geologist or geological curator, and applaud Dunedin for the series of 'Introducing' titles as a whole. They make attractive and useful titles which are easy to recommend to others trying to venture into our science.

*Matthew Parkes, Natural History Museum, Merrion Street, Dublin 2, Ireland.*